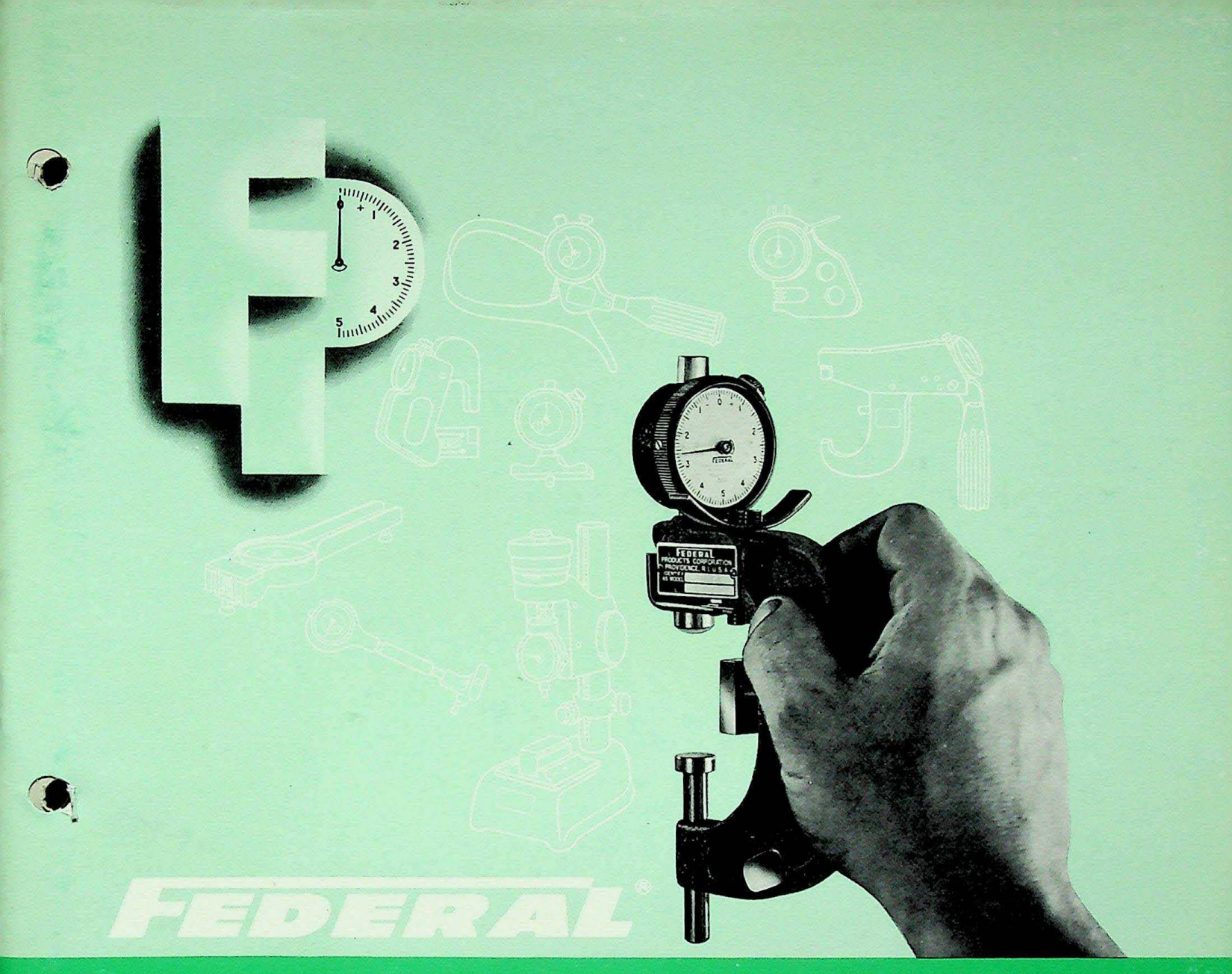
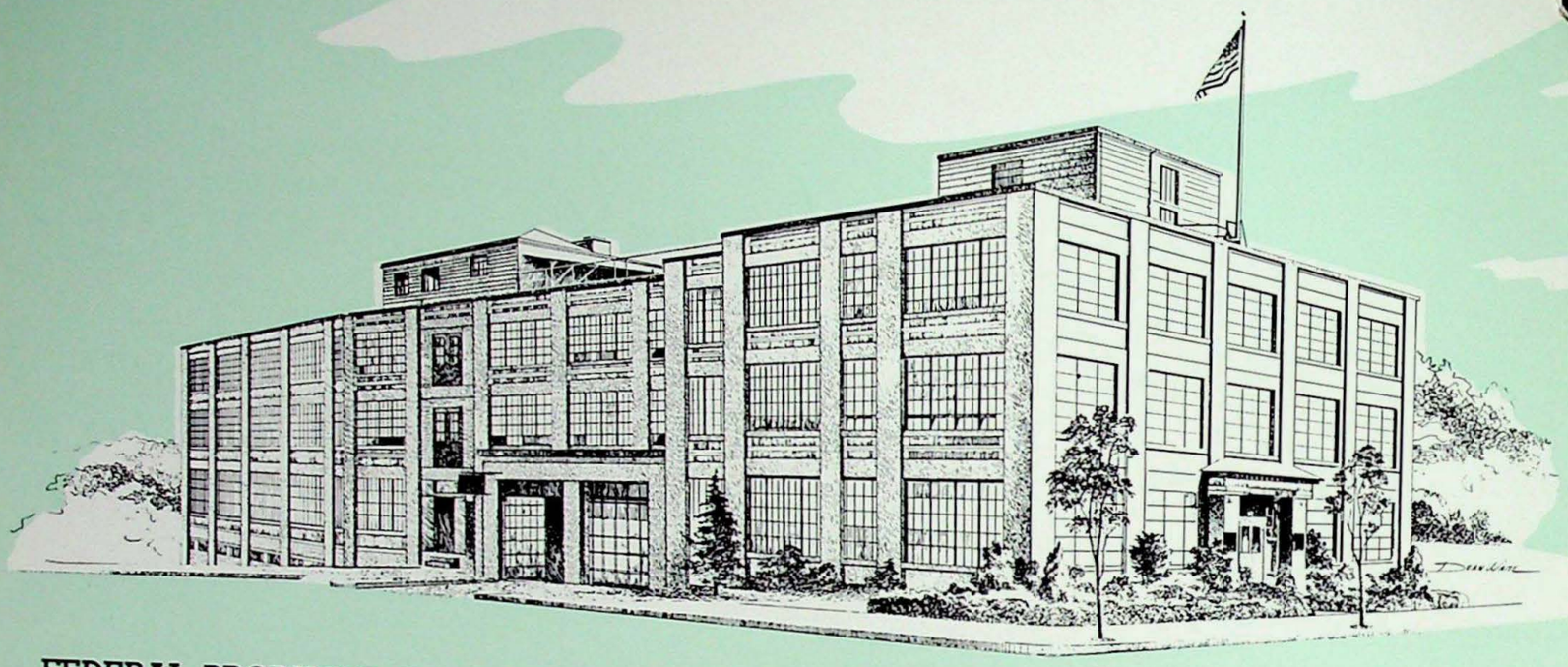


DIAL INDICATOR GAGES

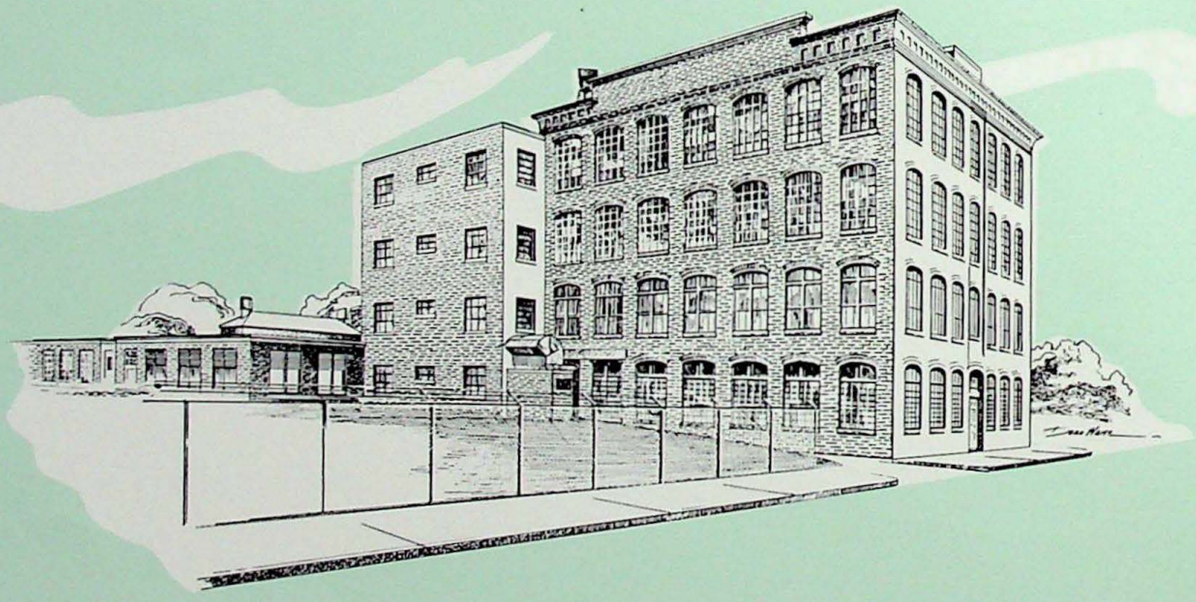
For DIMENSIONAL CONTROL

FEDERAL PRODUCTS CORPORATION

CATALOG 65G



FEDERAL PRODUCTS CORPORATION
PROVIDENCE 1, R. I., U.S.A.



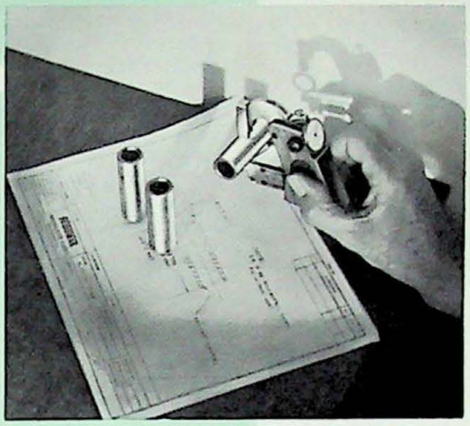
A company with over 40 years' leadership in the design and manufacture of precision measuring instruments realizes that absolute perfection is still beyond human capability. It also realizes that the nearer the approach to perfection the more difficult becomes each refinement.

And yet there is that condition of near perfection which can be obtained realistically by applying extra effort, extra care, and extra resourcefulness.

Such a company, by using this as a working principle, rather than merely setting it as a goal, effectively contributes to the progress of the field it serves. This contribution is reflected in excellence of product..

FEDERAL®

DIAL INDICATOR GAGES



This Catalog illustrates the most extensive line of Dial Indicator Gages and associated equipment available. However, should you fail to find what you need, please write. Federal makes so many special and modified gages, it is not practical to show them all.

PRECISION INSTRUMENTS FOR MEASURING AND COMPARING LINEAR DIMENSIONS

Type of Measurement	Model	Page
OUTSIDE DIAMETER		4 thru 10
micrometer	200	10
snap	300	5
	1000	6
	1330	7
	1340	9
SCREW THREAD		11
pitch diameter	45	11
INSIDE-OUTSIDE		12 thru 15
ID-OD comparator	36	13
adjustable	88P-100	14
single dimension ID	167	15
single dimension OD	236	15
CALIPER		16 and 17
outside	49	17
inside	149	17
INSIDE DIAMETER		18 thru 27
groove	99	27
plug type	165	23
hole	1201	21
	1203	22
	1204	22
	1242	25
	1243	25
	1250	19
	B3F	24

Type of Measurement	Model	Page
HOLE LOCATION		28 and 29
portable	205	29
DEPTH		30 and 31
portable	65	30
portable & bench	75	31
THICKNESS		32 thru 35
portable	22	32
	26	32
bench	57	35
sheet metal	644	32
bench	691	35
portable & bench	K	33
COMPARATOR		36 thru 43
bench	35	37
universal	100B-40	41
general purpose	NB-60	42
MISCELLANEOUS		
program gaging		43
adjustable masters		44
master rings and discs		45
special gages		47
other products		48
facts about gages and gaging		3
branch offices & representatives		back cover

Any of the gages shown in this catalog can be modified to suit specific requirements

For catalogs of OTHER FEDERAL PRODUCTS see inside back cover.

NOTE: The following trade names and their associated marks, as used in this catalog, are registered to Federal Products Corporation:
Federal, Testmaster, Miracle Movement, Electricator, Dimensionair, AirProbe.

CATALOG 65G

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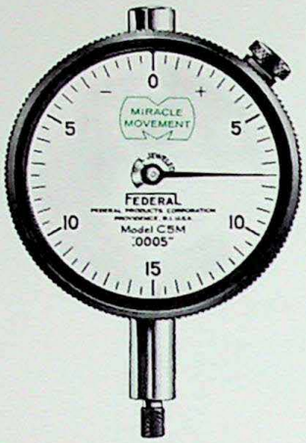
Basic Considerations



All Federal Dial Indicator Gages are equipped with MIRACLE MOVEMENT Dial Indicators. These Indicators are remarkably wear resistant and their movements outlast ordinary movements many times over. In addition, MIRACLE MOVEMENT Indicators are shock resistant, without the need for an extra cushioning device. For this reason we no longer refer to cushion movement Indicators in relation to any of our Gages.

These superior Indicators added to the other important qualities of proper design, good workmanship, and the right materials make Federal Gages far and away the best value attainable in a Dial Gage.

Basically, you buy a gage . . . or anything else . . . *when it pays you* to do so, when it will provide benefits greater than its *cost*, NOT ITS PRICE.

PRICE is merely what you pay to *get* the gage. COST is price *plus* the amount spent in using the gage or *because of using the gage*. A few cents *saved* in *price* can mean *dollars lost* if the information provided by the gage is incorrect. Price, then, is *comparatively* unimportant. A gage which is not accurate or does not *remain* accurate is no bargain at *any* price.

The *best protection* against HIGH COST is to *avoid* buying a gage "at a price". In other words, buy your gage from a reputable supplier of recognized experience. *He can't afford* to furnish you a gage which may open the door to costs *you* can't afford.

The right TYPE of gage is as important as the right BRAND of gage. The wrong gage for the job can lead to high cost through no fault of its own or that of the user. When there is a question about application, don't hesitate to ask for advice based on specialized knowledge. Any reputable supplier is glad to give it to you. It's part of his service.

Often there is the question about what gaging SYSTEM is best for the job (Dial Indicator, Air, Electric, or Electronic). You want the system which will *meet* your requirements, thus producing results at the *lowest* cost. It is quite easy, sometimes, to get a system which will *exceed* requirements, thus giving you results at *needless* expense.

Choice must be based on *impartial* advice and information. You're most likely to get this from a supplier that makes *all* these gaging systems. He can afford to be impartial because he is able to supply you with *whichever* system best meets your needs. To put it another way . . . it isn't likely that a salesman will recommend the *best* system, *if he hasn't got that system to sell.*

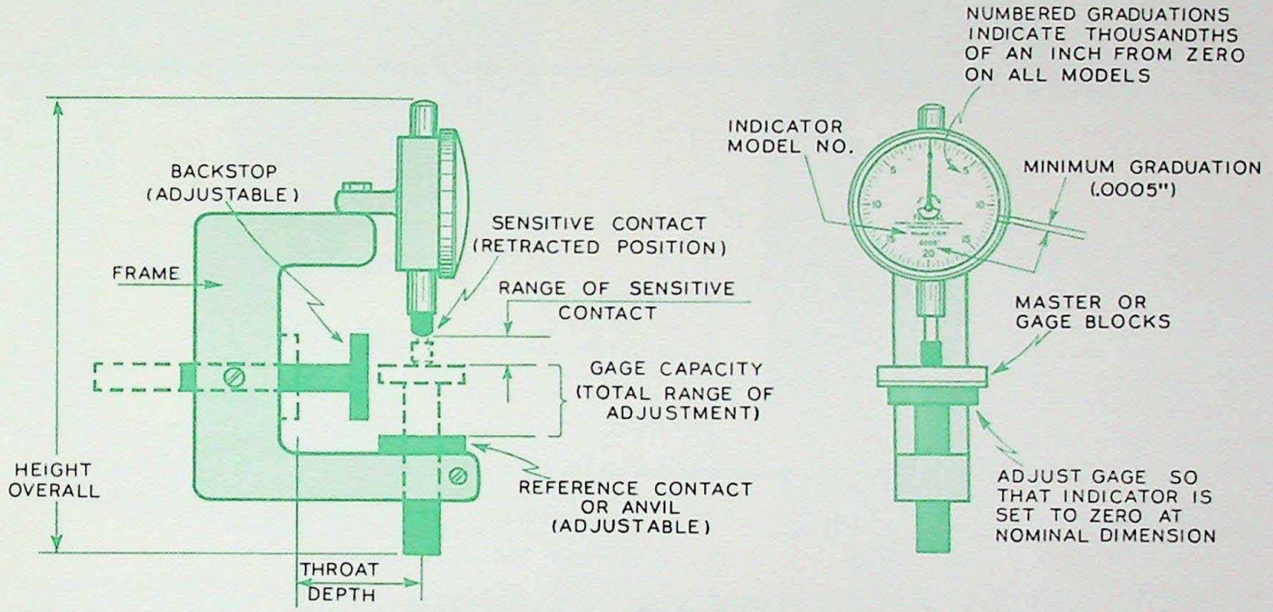
Although this catalog lists only Dial Indicator Gages, Federal makes other gaging systems: Air, Electric or Electronic. Catalogs describing these are yours for the asking.

There's no point in getting a one-sided picture when its so *easy* to get *all the facts*. There is a Federal representative near you, ready to give you these facts *impartially*.

Many concerns make some of these gaging systems; *only* Federal makes them *all*.

Nomenclature and Definitions

Names and terms used in gaging vary in meaning from time to time and between users. Some of the more liberally interpreted ones are explained below.


NUMBERED GRADUATIONS INDICATE THOUSANDTHS OF AN INCH FROM ZERO ON ALL MODELS
INDICATOR MODEL NO.
MINIMUM GRADUATION (.0005")
BACKSTOP (ADJUSTABLE)
SENSITIVE CONTACT (RETRACTED POSITION)
FRAME
RANGE OF SENSITIVE CONTACT
MASTER OR GAGE BLOCKS
GAGE CAPACITY (TOTAL RANGE OF ADJUSTMENT)
HEIGHT OVERALL
REFERENCE CONTACT OR ANVIL (ADJUSTABLE)
ADJUST GAGE SO THAT INDICATOR IS SET TO ZERO AT NOMINAL DIMENSION
THROAT DEPTH

ADJUSTABLE CONTACT — A contact, usually the reference contact, which is adjusted when setting the gage to measure a certain size workpiece.

ANVIL — a general term for a wide Reference Contact. Usually implies that the contact is flat.

CENTRALIZATION — Positioning of the gage so that its measuring contacts locate diametrically across the hole, as evidenced by a *maximum* reading. (Not to be confused with "squaring" the gage so that the contacts are perpendicular to the axis of the hole, as indicated by a *minimum reading).* May also apply to outside diameter measurement.

GAGING CAPACITY — sometimes referred to as total range of adjustment, embraces the maximum and minimum dimensions to which the gage can be adjusted for measurement with acceptable accuracy.

GAGING LENGTH — the maximum distance which gage contacts can enter a hole to check diameter or other condition, often referred to as gaging *depth* when entrance is vertical.

MAXIMUM READING — the farthest point to which the Indicator hand travels in the plus direction (usually clockwise).

MINIMUM READING — the farthest point to which the Indicator hand travels in the minus direction (usually counter-clockwise).

PLATEN — a flat, comparatively wide reference surface, sometimes referred to as Reference Table.

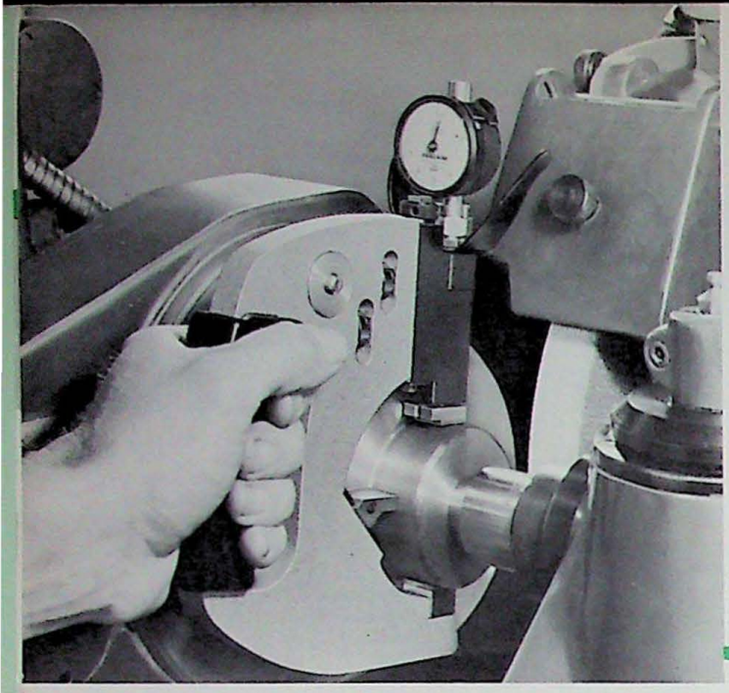
REFERENCE CONTACT — The point or surface from which a dimension is measured or a comparison of dimensions is made.

"ROCKING" — movement imparted to the gage to determine the point at which its measuring contacts are correctly aligned with the dimension being checked, as evidenced by a minimum reading.

SENSITIVE CONTACT — that contact point of a gage which is free to respond to the size of the workpiece being measured and from which the response is transferred to the Indicator dial.

SINGLE-DIMENSION GAGE — a gage designed and built to check one particular dimension. Some single dimension gages are adjustable, but only over a narrow range to compensate for wear.

SINGLE-PURPOSE GAGE — a gage which is designed for one type of measurement, e.g. Inside Diameter. Gage may be either adjustable or made to check a single dimension.



All Series 300P Gages will check between shoulders only slightly more than $\frac{5}{8}$" apart and will clear a $2\frac{1}{8}$" face. The anvils clear the frame by 1/32" on each side. Sides of anvils maintain their alignment to assure accurate measurement right at the work shoulder. Special anvils are also available for gaging narrow groove diameters, short diameters adjacent to shoulders, etc.

The moulded handle is contoured for a non-slip grip, even when hands are wet or oily. It is made of durable plastic so that the gage is effectively protected against body heat. A hex wrench, the only tool needed for setting size, is retained snugly in the handle where it is always available for locking the backstop and size adjustment.

WHEN ORDERING, PLEASE SPECIFY:

1. Model Number of Gage (See Capacity Table).
2. Model Number of Indicator.

REGULAR PRICE INCLUDES:

1. Protective Case.
2. Hex Wrench.

OPTIONAL AT ADDITIONAL COST:

1. Bench Stand for Gage — BA-26.
2. Bench Stand for Disc Masters — BA-71.
3. Special Anvils.

SPECIFICATIONS

INDICATOR*	Choice of	
300P-1 through 5	B21	B5M
300P-6 through 14	C21	C5M
Minimum Graduation	.0001"	.0005"
Dial (Balanced & Adjustable)	0–5–0	0–15–0
RANGE OF SENSITIVE CONTACT (PLUNGER TRAVEL)	.020"	
CONTACTS (ANVILS)		
Material	Tungsten Carbide	
Dimensions	$\frac{5}{8}$" x $\frac{5}{8}$" (nominal)	
RANGE OF SIZE ADJUSTMENT	1.00"	
CAPACITY	See Table (opposite page)	

*Metric Models also available.

Each 300P Series Model is furnished with a specially fitted protective case.

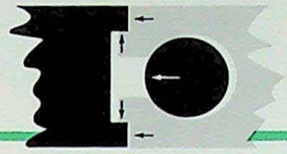
Bench Stand for Disc Masters will hold any AGD type disc up to 5" diameter and $1\frac{1}{8}$" wide. Two $\frac{1}{4}$" holes provided for mounting.

Bench Stand for Gage clamps the gage frame firmly without distortion. A $\frac{1}{4}$" hole is provided for mounting, but supports smaller Models as is.

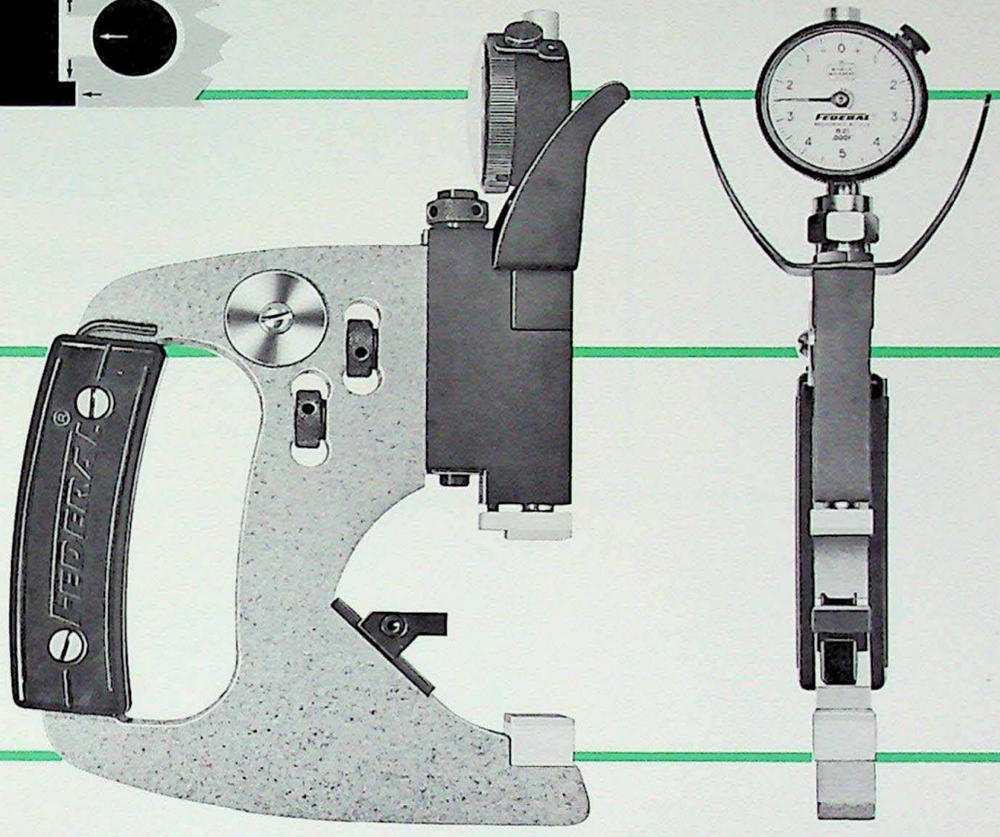
Use FEDERAL Masters. See page 45

SNAP GAGES
Indicating

CHANNEL LOCK ACTION



SERIES 300



FULL JEWELED
MIRACLE MOVEMENT
DIAL INDICATORS

Model	Capacity
300P-1	0″–1″
300P-2	1″–2″
300P-3	2″–3″
300P-4	3″–4″
300P-5	4″–5″
300P-6	5″–6″
300P-7	6″–7″
300P-8	7″–8″
300P-9	8″–9″
300P-10	9″–10″
300P-11	10″–11″
300P-12	11″–12″
300P-13	12″–13″
300P-14	13″–14″

KEEPS ITS PRECISION AS NO OTHER SNAP GAGE CAN!

For years, there has been a great need for an indicating snap gage that maintains its anvil parallelism throughout its full range of adjustment. This need has now been answered by Federal's new 300P Series Indicating Snap Gages. Available in fourteen models covering capacities up to 14″, these gages have three major design features which, for the first time, provide truly parallel gaging surfaces.

The lower (reference) anvil is an integral part of the gage frame, eliminating the usually troublesome rod support of other adjustable snaps. There are no extensions to interfere when gaging a workpiece in the machine.

Size is set by adjusting the frame itself with the knurled wheel near the Indicator; load is distributed over the long, straight bearing surfaces to retain anvil parallelism.

Size adjustment is secured by Federal's unique "Channel Lock" action (patent applied for). The split-tongue profile of one bearing surface is clamped against the groove of the other so that the position of the upper anvil is precisely and firmly maintained from side to side as well as from front to back (see diagram above). The two knurled wheels in the frame assure ample locking force without distorting the gage frame.

All 300P Series Gages are furnished with either .0001″ or .0005″ grad. Indicators (your choice), but can be used successfully with any AGD type Federal Indicator, even those having .000050″ grads. The Indicator can be set to face in any direction and is protected by a sturdy steel guard. Direct contact is made with a large diameter, hardened steel plunger which rides in widely spaced bronze bearings for precise axial motion.

The gage frames are made of special alloys for extra strength, lightness and stability; cast aluminum for Models 300P-1 through 5, magnesium for Models 300P-6 through 14. The anvils are tungsten carbide, $\frac{5}{8}$″ square and chamfered, clearing the frame by 1/32″ on each side. The handle is contoured for a non-slip grip and is made of plastic to insulate the gage from body heat. A hex wrench for locking the frame and backstop adjustments is furnished with each gage. It fits snugly into the handle and is the only tool needed for setting size.

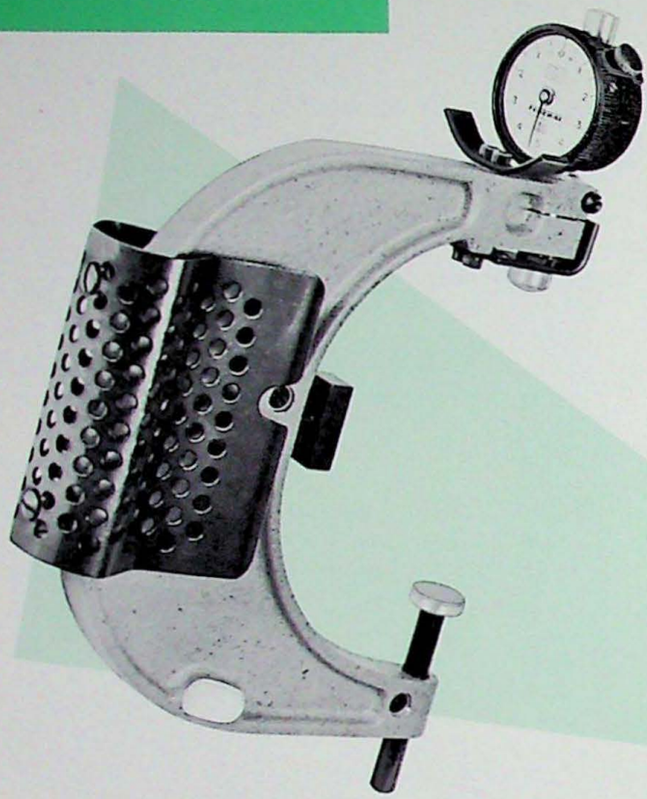
Size adjustment is continuous over a 1″ range; the fine pitched thread provides smooth control even when high magnification Indicators are used. Gaging pressure is uniform, just right for correct support and seating.

FULL JEWELED

MIRACLE MOVEMENT

DIAL INDICATORS

MODELS 1000P-1 — 1000P-9



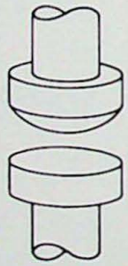
Model	Capacity
1330P-88	0 to 3⅝"
1330P-78	3½" to 6⅛"

HEAVY DUTY 1330 SERIES

Ruggedly built, Series 1330 Heavy Duty Models have greater gaging ranges than other 1330 Models. The large contacts are tungsten carbide surfaced and parallel. The upper (reference) contact supports the weight of the gage and is flat. The lower contact is cylindrically radiused. These Models are also available as non-adjustable, single dimension gages for measuring large diameters and can be easily modified to meet other special requirements.

NINE STOCK SIZES

Model No.	Capacity	Reference Anvil Dimensions
1000P-1	0" to 1"	.500" Dia.
1000P-2	¾" to 2"	.500" Dia.
1000P-3	1¾" to 3¼"	.500" Dia.
1000P-4	3" to 4½"	.625" Dia.
1000P-5	4" to 6"	.625" Dia.
1000P-6	6" to 8"	.750" Dia.
1000P-7	8" to 10"	.750" Dia.
1000P-8	10" to 12"	.750" Dia.
1000P-9	12" to 14"	.750" Dia.



Upper contact radiused, lower contact flat

MAIN FEATURES

- ADJUSTABLE LOWER ANVIL FOR LONG RANGE CAPACITY.
- ADJUSTABLE BACKSTOP ASSURES QUICK WORK-PIECE POSITIONING.
- BOTH CONTACTS ARE TUNGSTEN CARBIDE FOR LONG SERVICE.
- NARROW FRAME FOR GAGING BETWEEN CLOSELY SPACED SHOULDERS.
- INDICATOR CAN BE SET TO FACE ANY DIRECTION AND POSITIVELY LOCKED.
- STURDY GUARD PROTECTS INDICATOR.
- INSULATED HAND GRIP FURNISHED ON MODELS 1000P-3 THROUGH 1000P-9.
- SPRING-LOADED SENSITIVE CONTACT COUNTERACTS GAGE WEIGHT.

Bench Stand

Models 1000P-1 through 1000P-5 have a boss for easy mounting on Bench Stand (BA-26).

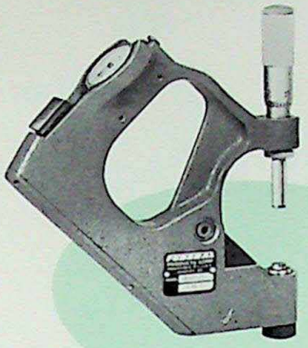
Use FEDERAL Masters. See page 45

SPECIFICATIONS (ALL MODELS)

	1000P		1330P 100 & 200	1330 Heavy Duty
INDICATOR				
Model	B21	B5M	T-2 Testmaster	C21
Minimum Graduation	.0001"	.0005"	.0001"	.0001"
Dial (Balanced & Adjustable)	0-5-0	0-15-0	0-4-0	0-5-0
Metric Model	P1I	061	T-3 Testmaster	P1I
CONTACTS (Sensitive & Reference)				
Material	Tungsten Carbide		Tungsten Carbide	Tungsten Carbide
Dimensions	.50" dia.		⅝" dia. (P-100) ¼" dia. (P-200)	½" x 1¼"
RANGE OF SENSITIVE CONTACT	.020"		.008"	.025"
GAGE CAPACITIES	See Table		See Table	See Table
STARTING GAGING PRESSURE				1½-1¾ lbs.
WEIGHT (Approx.)	15 oz. (1000P-1) 4 lbs. (1000P-9)		15 oz.	2 lbs. 10 oz.

SNAP GAGES
Indicating

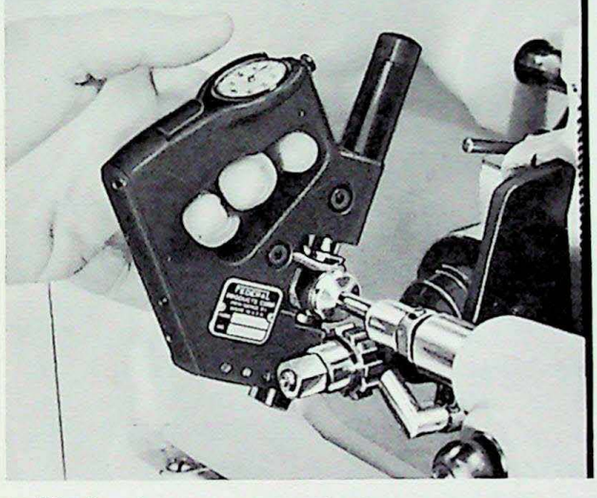
SERIES 1330 and 1000



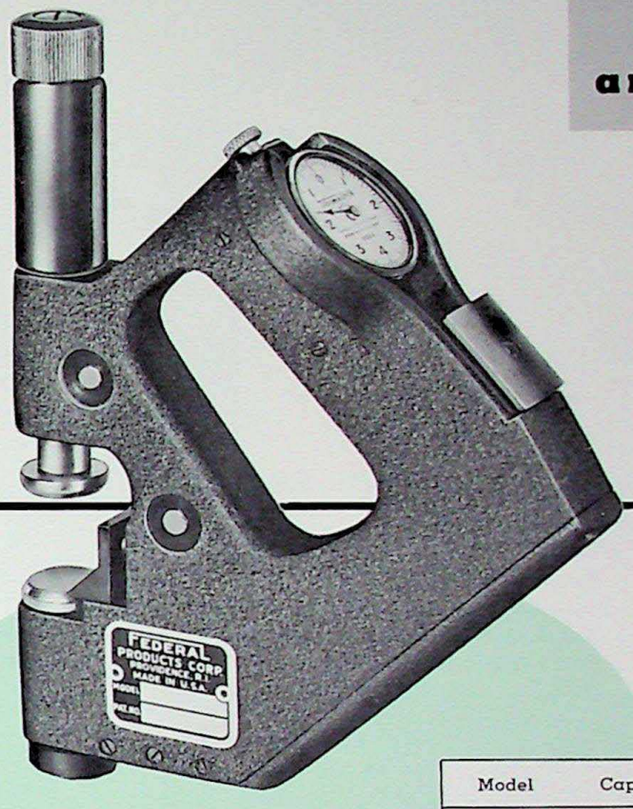
Model	Capacity
1330P-200	0" to 1"
1330P-201	1" to 2"
1330P-202	2" to 3"
1330P-203	3" to 4"

MICROMETER SNAP GAGE

These Gages are very similar in design to the 1330P-100 Series except that a micrometer barrel, spindle, and spindle lock are provided instead of an adjustable upper contact. With these features, the 1330P-200 Series Gages correspond in operation to the Federal Indicating Micrometer (see page 10), featuring comparable accuracy and uniform gaging pressure, but with capacities as great as four inches.



Weight of gage rests on fixed contact so that measurement is not influenced. Light pressure on thumb button retracts the sensitive anvil.



Model	Capacity
1330P-100	0" to 1.00"
1330P-101	1" to 2.00"
1330P-102	2" to 3¼"
1330P-103	3¼" to 4½"

RETRACTABLE CONTACT SNAP GAGE

Three types of Series 1330 Snap Gages are available to answer a variety of needs in connection with the measurement of outside diameters.

The Model 1330P-100 Type Gage is a lightweight, accurate instrument employing sensitive contact retraction by means of a button conveniently located for thumb operation. Both tungsten faced contacts or anvils are ground flat and parallel making it possible to take accurate measurements in areas next to shoulders which cannot be reached with radiused contacts. A frictionless unit transfers motion of the lower (sensitive) contact to a Full-Jeweled, Low-Friction Testmaster Indicator which is set in the gage at a convenient angle for clear and decisive reading of the dial. Weight of the gage rests on the upper (reference) anvil which is adjustable over a one inch range by means of a threaded thimble. An adjustable backstop is provided to locate the part for proper measurement. Both anvil and backstop can be securely locked at any setting. The narrow contours of this type gage make it extremely well suited to measurement between closely set shoulders; its compactness and light weight make it extremely easy to handle. Its accuracy and reliability distinguish it as an extremely fine measuring instrument.

WHEN ORDERING, PLEASE SPECIFY:

1. Model Number of Gage (See Gage Capacity Tables).
2. Model Number of Indicator.

UNLESS OTHERWISE SPECIFIED:

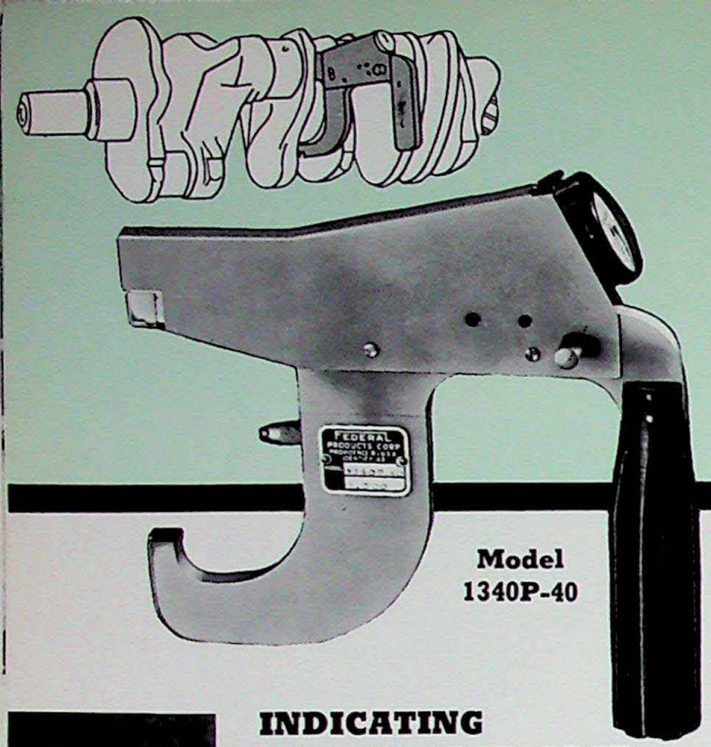
1. Indicator having .0001" graduations will be furnished.
2. Contacts will be Tungsten Carbide.

OPTIONAL — At Reduced Cost:

1. Plain Bearing Indicator for 1000P and 1330 Heavy Duty Models.
2. Hardened Steel Contacts for Series 1000P Models.
3. Indicator having .0005" graduations for Series 1000P Models.

— At Additional Cost:

1. Bench Stand (BA-26) for Models 1000P-1 through 1000P-5.
2. Special Contacts and/or other Modifications.
3. Protective Case.

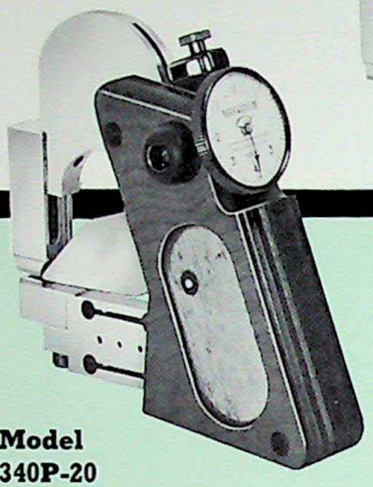


Model
1340P-40

ADJUSTABLE TYPE 1340 GAGES

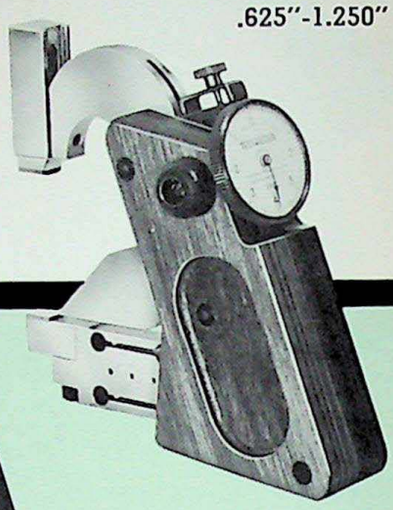
With cylindrical upper anvil

.062"-.625"

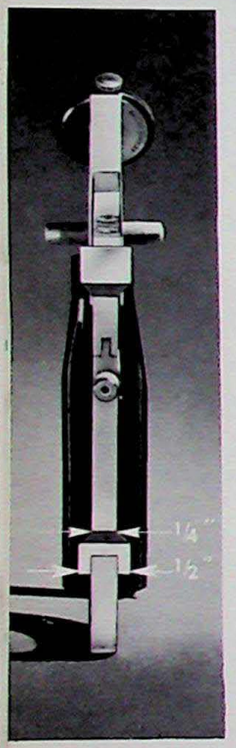


Model
1340P-20

.625"-1.250"



Model
1340P-21



INDICATING CRANKSHAFT GAGE

Model 1340P-40 is essentially a long reach version of the Regular Type 1340 Snap Gage, suiting it particularly to diameter measurement of crankshafts and similar work where projections are large and/or closely spaced. Though extremely thin, this Gage is exceptionally rigid and free of side play by virtue of its solid steel frame construction. Positive protection is also provided by the frame for the motion transfer unit, preventing accidental breakage. Both anvils are lapped flat and parallel, permitting measurement close to shoulders and are specially shaped to avoid contact with fillet. The 1340P-40 can be made to any specified dimension between 1⅞" and 3". Anvils and frame can be modified to suit special requirements at slight additional cost.

Wide popularity of the regular type 1340 Snap Gage has fostered demand for adjustable Models incorporating the same quality features but suited to general shop use. As a result two Models, 1340P-20 and 1340P-21, are now available covering dimensions between 1/16" and 1¼". They are similar in design to Model 1340P-1 except that they incorporate an adjustable reference anvil which can be easily set to the required dimension and locked securely. Any minor compensation required to obtain exact setting of the gage is easily made by adjustment of the Indicator Dial. This upper anvil is radiused cylindrically .375" side to side, the lower (sensitive) contact is flat. The front edge of both anvils is radiused slightly so that work may be quickly guided into proper position which is determined by angled backstop.

WHEN ORDERING:

SINGLE DIMENSION MODELS

1. Please specify dimension to be measured

ADJUSTABLE MODELS

1. Please specify Model Number of Gage
   (Unless otherwise specified, Indicator having English graduations will be furnished)

AVAILABLE AT ADDITIONAL COST:

1. Special Contacts, Backstops, etc.
2. Modifications to suit special requirements (Please send work sample or blueprint)

Use FEDERAL Masters. See page 45

SPECIFICATIONS

INDICATOR
- Model ..... Model T-2 Testmaster
- Minimum Graduations ..... .0001"
- Dial (Balanced, Adjustable) 0-4-0
- (Metric Indicator Available)

CONTACTS (Sensitive & Reference)
- Material ..... Tungsten Carbide
- Measuring Surface Dimensions ..... .250" x .312"
- (Upper contact on adjustable Models is cylindrically radiused .375" side to side.)

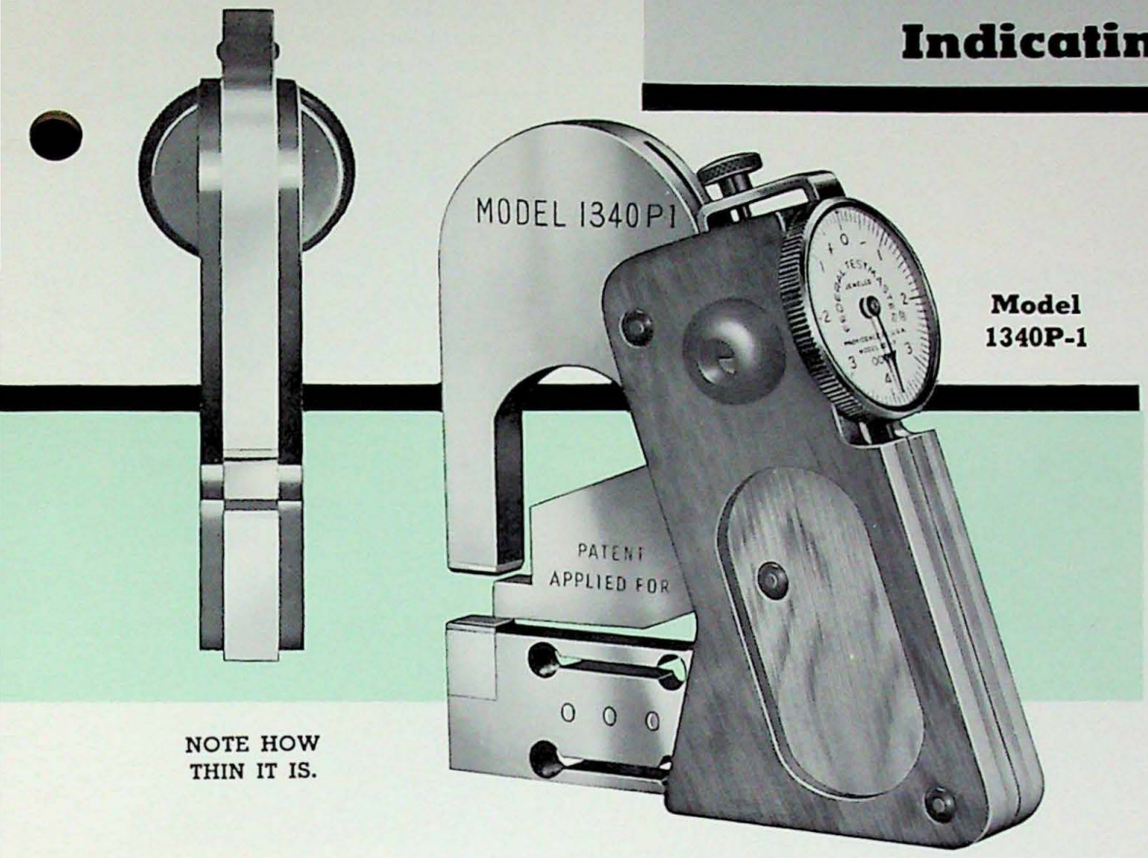
RANGE OF SENSITIVE CONTACT ..... .008"

BACKSTOP ..... Hardened Steel

	Single Dimension Models		Adjustable Models	
	1340P-1	1340P-40	1340P-20	1340P-21
GAGE CAPACITY	Any single dimension between		Adjustable between	
Minimum	.125" &	1.875" &	.062" &	.625" &
Maximum	1.875"	3.000"	.625"	1.250"
MAX. THICKNESS (Arm or Contact)	.250"	.500"	.375"	.375"
WEIGHT	7 oz.	14 oz.	9 oz.	8 oz.

SNAP GAGES
Indicating

SERIES 1340



Model 1340P-1

NOTE HOW THIN IT IS.

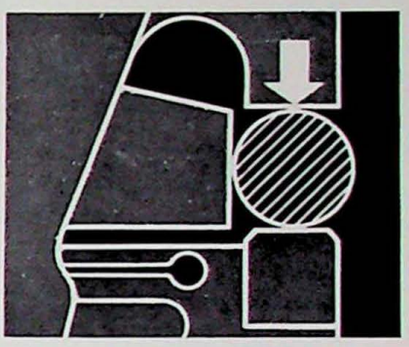
ANY ONE DIMENSION BETWEEN 1/8" AND 1 7/8"

SINGLE DIMENSION INDICATING SNAP GAGE

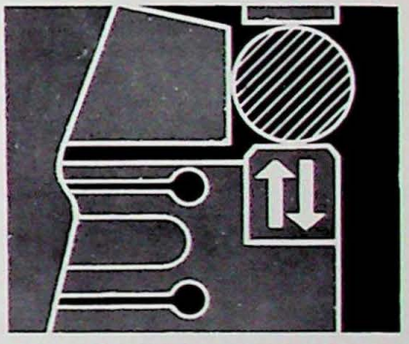
Old style, non indicating, snap gages have — in the past — provided a reliable means of judging dimensional limits. Tolerances, compared to those of today, were liberal. You had room to guess in, so to speak. However, even an educated guess under today's precision requirements is an open invitation to production failure. True, tolerances are severe, but only because there are indicating gages which can reliably cope with fine measurement and *show* slight variations before it's too late. One of the most popular of these gages is the Model 1340P-1 Indicating Snap Gage.

Proven extremely dependable and accurate over prolonged periods, the 1340P-1 is also extremely compact and sensitive. Both tungsten carbide anvils are lapped flat and parallel. Any weight applied during gaging is borne by the upper, fixed, contact or anvil so that the lower sensitive contact is free to follow exact dimensional variation without influence. Ingenious design of the solid steel frame permits frictionless transfer of contact motion to the highly sensitive and accurate Testmaster Indicator. A comfortable waterproof, oilproof handle provides ample insulation against hand temperature, even during prolonged periods of gaging.

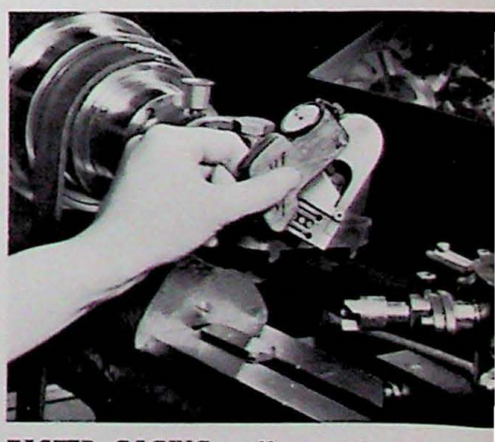
While preserving all the simplicity, compactness and unity of a conventional type gage, the 1340P-1 permits faster inspection, since it eliminates gaging by feel. Made to measure a specific dimension, it is economical to buy and use; pays for itself many times over in convenience, simplicity, accuracy and long life.



THE READING is not influenced by weight of Gage, nor by user's hand because weight of gage and hand rests upon upper solid anvil.



THE SENSITIVE ANVIL is ingeniously designed to transfer dimensional variation to Indicator. Both anvils are tungsten carbide inserts for long wear and are lapped parallel.



FASTER GAGING — *No guessing.* The 1340 *shows* .0001" variations instantly.

INDICATING MICROMETER

LARGER CAPACITY Micrometer type Snap Gages are listed on page 7.

MODEL 200P-1

0" to 1"

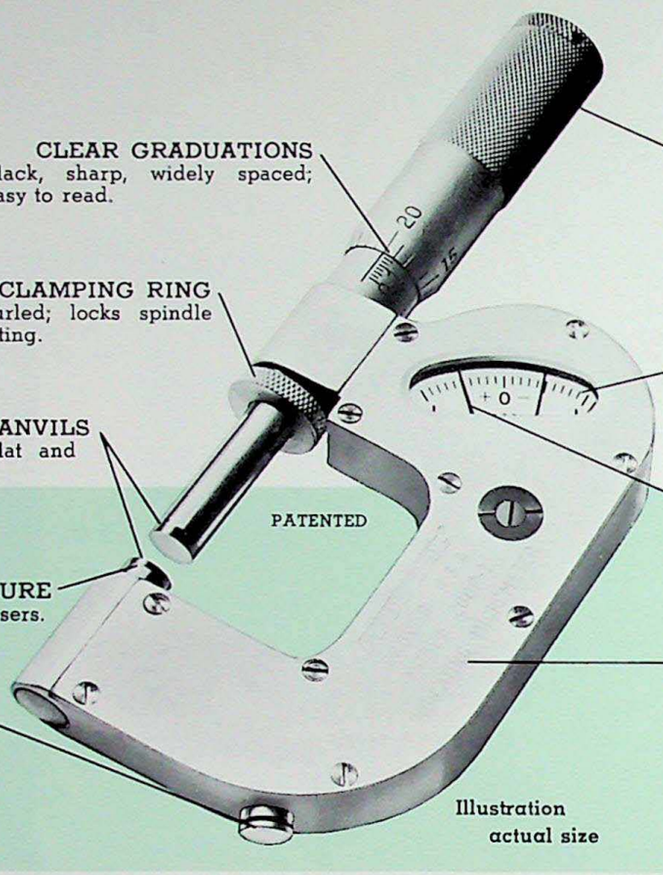

CLEAR GRADUATIONS
Black, sharp, widely spaced; easy to read.
ACCURATE MEASURING THREADS
Large, highly precise and uniform; permit easy, accurate turning of barrel.
CLAMPING RING
Deeply knurled; locks spindle without shifting.
QUICK READING INDICATOR
Full-jeweled, low-friction Movement; clearly calibrated scale, .0001" grads.
TUNGSTEN CARBIDE ANVILS
Lapped and polished flat and parallel.
PATENTED
ADJUSTABLE TOLERANCE HANDS
Easily set, colored red for good visibility.
UNIFORM ANVIL PRESSURE
Consistent accuracy for all users.
DULL CHROME FINISH
Attractive, long wearing and non-glare.
PUSH-BUTTON ANVIL RETRACTION
Provides ample clearance for quick insertion or instant release of work.

Illustration actual size

THE FEDERAL INDICATING MIKE OUT-PERFORMS ALL OTHERS . . .

. . . because there are no vernier readings to interpret and miking accuracy does not depend upon the operator's sense of feel. The lower anvil of the Federal Indicating Mike is actually the sensitive contact of the built-in Dial Indicator which provides "tenth" readings quickly and clearly. Because the Federal Indicating Mike applies identical gaging pressure regardless of who is using it, errors of feel are eliminated. Thus, the novice obtains the same uniform results as the experienced operator.

Superior accuracy isn't the only feature of the Federal Indicating Mike. The full-jeweled movement offers maximum sensitivity. In addition, the 200P-1 has a greater throat depth and is smaller and lighter than other indicating mikes. Thus, it is much easier to handle, but does not sacrifice sturdiness. Since the lower anvil is retractable, the Federal Indicating Mike doubles as an indicating snap gage, allowing quick and easy insertion and extraction of workpieces. Because of its excellent calibration accuracy, size can be set anywhere on the indicating range.

SPECIFICATIONS

Minimum Graduations..0001"	Indicator Range.....±.001"
Dial.....1–0–1	Capacity.....0" to 1"

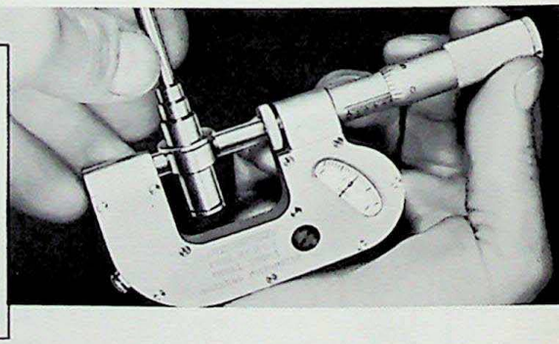
Tungsten Carbide Anvils Lapped Parallel and Flat.

Furnished Complete in Protective Case.

USE THE 200P-1 AS . . .

A MICROMETER

The spindle is brought into contact with the work. The thimble is adjusted to the nearest thousandth mark and the dial then read to the nearest ten-thousandth.



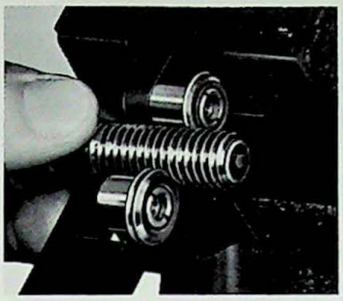
AN INDICATING SNAP GAGE

Spindle is clamped after setting to required dimension. Tolerance hands are set to desired limits. Parts are then gaged for accuracy. Push button retracts lower anvil.

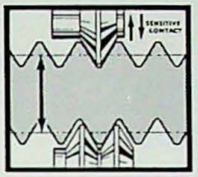
THREAD GAGES

SERIES 45

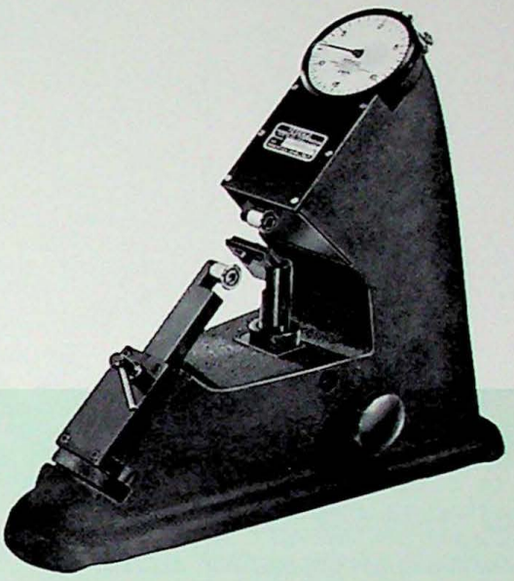
FULL JEWELED
MIRACLE MOVEMENT
DIAL INDICATORS

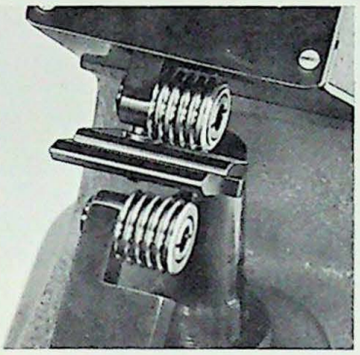


THE GAGE is easily set to check any diameter within its range. The sizes available are listed below.



LEAD ERRORS DO NOT AFFECT READINGS. CONTACTS ENGAGE ONE THREAD ONLY.





MULTIPLE-RIBBED ROLLER ANVILS can be furnished upon request.

SPECIFICATIONS

INDICATOR
- Model D5M
- Minimum Graduation ..... .0005"
- Dial (Balanced, Adjustable) 0–15–0
- Metric Indicator (graduated .01 mm.) Q6I

CONTACTS (American National Form Thread) ..... Roller Anvils
(Suitable for most other 60° threads. See pitch ranges below)
RANGE OF SENSITIVE CONTACT ..... .025"
GAGE CAPACITY ..... See below
SIZE, OVERALL (L-W-H) ..... 12½"x6½"x11"
WEIGHT (Approx.) ..... 30 lbs.

Capacity	MODEL
⅛" to 1"	45B-100
1" to 2⅛"	45B-110
⅛" to 2⅛"	45B-120

ROLLER ANVILS, supplied as extra for the size specified. Range of pitches for each set of roller anvils, as follows:

4½ to 6	14 to 20	44 to 56
7 to 10	22 to 30	64 to 80
11 to 13	32 to 40	

MULTIPLE-RIBBED ROLLER ANVILS CAN BE FURNISHED ON REQUEST. ROLLER ANVILS LISTED ABOVE ALSO COVER EQUIVALENT METRIC PITCHES.

WHEN ORDERING:

Please list Model Number and capacity desired.

Roller anvils must be ordered separately, not included in price of Gage. Please specify range of pitches desired (see specifications).

OPTIONAL AT EXTRA COST:
Multiple ribbed roller anvils.

PITCH DIAMETER GAGE

Series 45 Gages permit fast, accurate, positive inspection of the pitch diameter of threads by means of roller contacts or anvils. Only one thread is contacted so that possible lead error will not affect the diameter reading. The upper (sensitive) roller anvil has a single annular rib ground for correct fit between two adjacent threads (see illustration). Its movement is transferred without friction to the Indicator. The adjustable lower anvil references the work by means of a double annular rib which makes contact on either side of the thread. Both anvils are free to rotate so that wear is distributed evenly. They are also free to slide laterally for quick positioning on the thread. The anvil ribs are located at the end of the rolls to permit checking threads close to shoulders. Each set of rollers covers several pitch diameters (see below) and are quickly interchangeable.

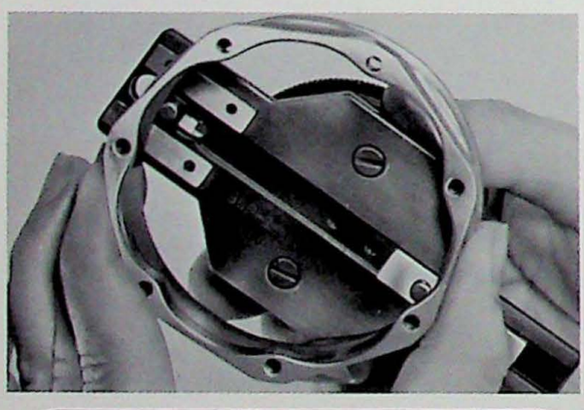
Positioning of the work is made easy by a blade backstop which has three way adjustability; to accommodate various diameters, to permit proper positioning against various size work, and to accommodate parts with shoulders. The Roller Anvils are suitable for checking practically all 60° thread forms (American National, Unified, American Internal and External, American Standard, International Metric etc.)

PORTABLE MODELS 36P

Models 36P-1 and 36P-2 are adjustable, compact Comparators for checking shallow diameters, the width of slots, spacing between flanges and similar conditions. They are two-contact Gages that locate directly on the diameters (either inside or outside) being inspected. Because of their compact size and ease of handling, these Gages are ideally suited for checking workpieces while still in the chuck. Contacts are back-tapered to assure point-to-point measurements. Special contacts can be furnished for special applications.

EASILY CONVERTED TO I.D. OR O.D. MEASUREMENT

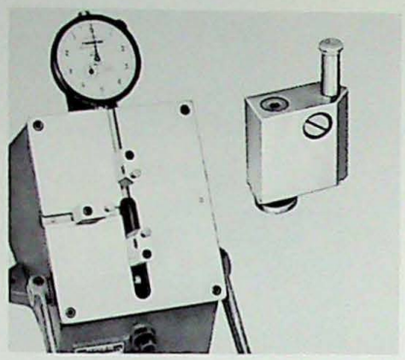
By reversing the position of the Indicator on the frame and interchanging the sensitive contact with the retraction button of the Indicator, the Gage can be changed from I.D., to O.D. or vice-versa.



SPECIFICATIONS (Both Models)

INDICATOR		
Model		C21
Minimum Graduations		.0001"
*Dial (Balanced & Adjustable)		0–5–0
CONTACTS (Sensitive & Reference)		Hardened Steel
RANGE OF SENSITIVE CONTACT		.100"
GAGING DEPTH		.125"
GAGE CAPACITIES	36P-1	36P-2
Inside Diameters	1.125" to 4.50"	3.00" to 7.125"
Outside Diameters	.750" to 4.125"	2.625" to 6.875"

*With Revolution Counter.



ADJUSTABLE JAWS Available for use with either Model 36B-6 or 36B-15. Made of hardened steel. Accurately ground. Adjustable for height (.031 to .750"). Reversible for either inside or outside measurement. Polished button contacts (.250" diam.) Platform of jaw forms rest surface for workpiece. Size: 1" long x .437" wide. Platform extends approx. 1" above plate.

SPECIFICATIONS

	For gage using: T Plate	V Plate
INDICATOR		
Model	D2I	D2K*
Minimum Graduation	.0001"	.0001"
Dial (Balanced, Adjustable With Revolution Counter)	0–5–0	0–4–0
(Metric Models Available)		
CONTACTS (Jaws)	Made to Specifications	
RANGE OF SENSITIVE CONTACT	.100	.100

SIZE	PLATE	OVERALL
36B6	5" x 6"	6" x 10" x 8¾" high
36B15	8" x 10"	8" x 12" x 11¼" high

WEIGHT (Approx.)	
36B6	22 lbs.
36B15	46 lbs.

GAGE CAPACITY
(36B6 Using JW-9 Jaws)
(36B15 Using JW-10 Jaws)

INSIDE DIAMETERS

	"T" PLATE (2 Jaws)		"T" PLATE (3 Jaws)		"V" PLATE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
36B6	.750" (.125)**	4.438"	.750"	4.438"	.813"	3.875"
36B15	.750" (.125)**	7.00"	.750"	7.000"	.813"	7.50"

OUTSIDE DIAMETERS

36B6	.250"	3.875"	.250"	3.875"	.313"	3.875"
36B15	.250"	7.00"	.250"	7.00"	.313"	7.00"

*Special Ratio
**Can be obtained using special jaws

GAGING HEIGHT (Both JW-9 and JW-10)	
Minimum	.031"
Maximum	.750"

WHEN ORDERING:

1. Please specify Model Number of Gage
2. Select type of cover plate desired ("V" Plate furnished as an extra on 36B-15)

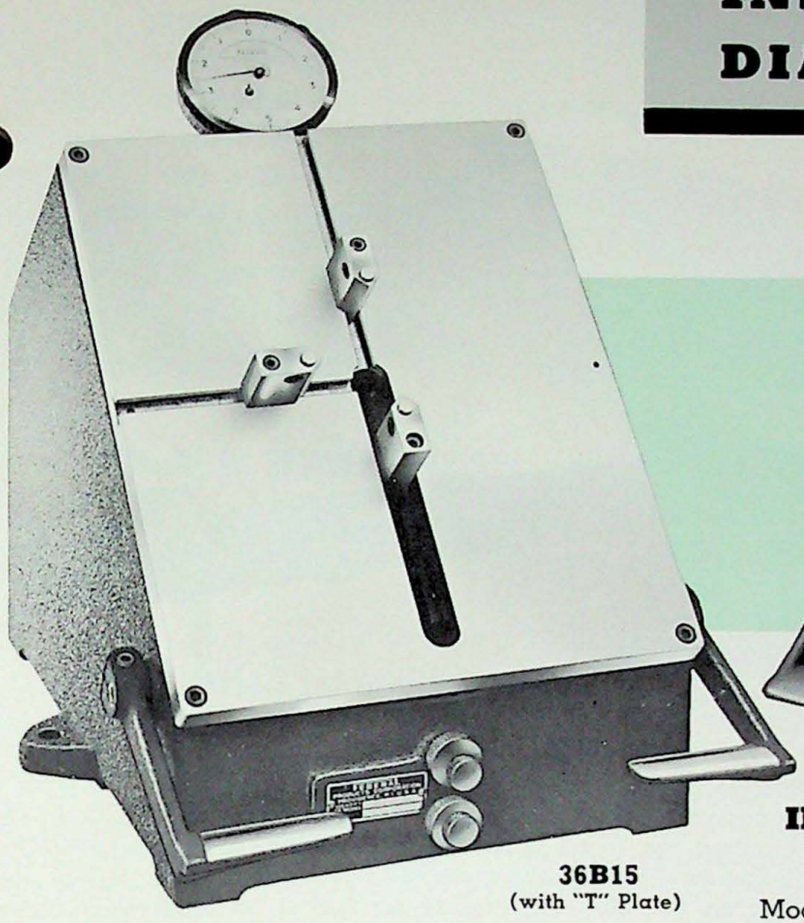
OPTIONAL AT SLIGHT ADDITIONAL COST:

1. Jaws (Federal Type JW or special design. If special jaws desired, please send blueprint and data).
2. Greater gaging capacity (either Model)
3. Modifications for special types of measurements.

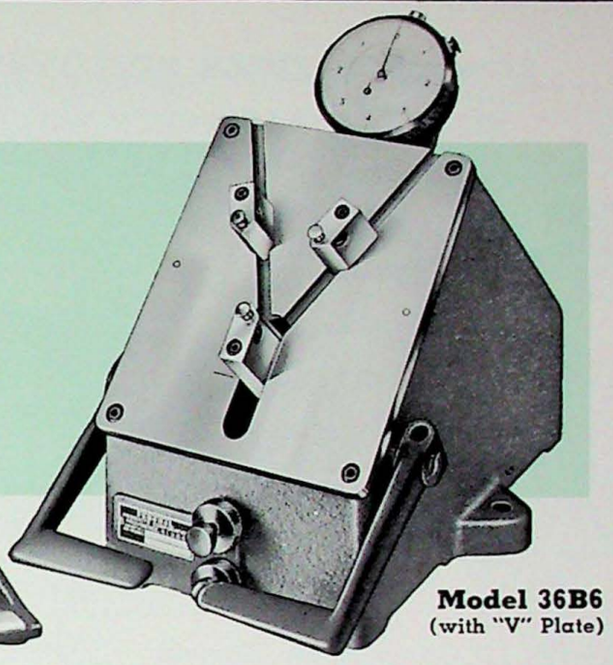
INSIDE – OUTSIDE DIAMETER GAGES

SERIES 36

FULL JEWELED MIRACLE MOVEMENT DIAL INDICATORS



36B15
(with "T" Plate)



Model 36B6
(with "V" Plate)

INTERNAL-EXTERNAL COMPARATOR
With Adjustable Contact Pressure

Models 36B-6 and 36B-15 are versatile Comparators for use at the bench or at the machine to check both inside and outside diameters. They closely resemble each other, except that the 36B-15 is larger and therefore capable of checking larger diameters. Changing from one type of diameter measurement to the other is easily accomplished on either gage by simply re-orienting the plate and each of the jaws 180°.

EXCELLENT SENSITIVITY Any changes in position of the sensitive jaws are transferred to the indicator by means of a frictionless pantograph unit. Dimensional variations are shown with positive accuracy on the indicator which, for optimum visibility, is located at the top of the gage.

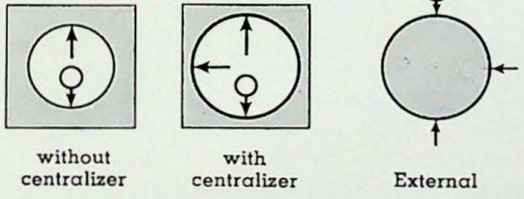
ADJUSTABLE CONTACT PRESSURE The operator can change contact pressure of the jaws against the workpiece to suit requirements by adjusting the upper knurled thumbscrew at the front of the gage.

For convenience or so that workpieces will not be marred while being placed in position, the sensitive contact is retracted by pressing on either of the finger levers at the front of the gage. Amount of retraction is adjusted by turning the lower knurled thumbscrew.

ADJUSTABLE JAWS AVAILABLE Since gaging requirements vary considerably, jaws for either gage are an optional item and furnished as extra. Federal Adjustable Type Jaws are highly recommended since they are adjustable for height and designed to suit most gaging requirements. The top surface of each jaw forms a rest surface for the workpiece.

CHOICE OF COVER PLATES Several types of plates are available, depending on the method of diameter measurement (see explanation above left). The top surface of each plate provides support for the reference jaws and to hold fixtures which may be necessary in making special types of measurements.

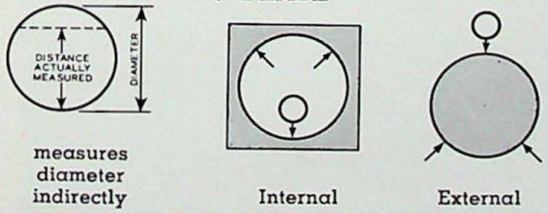
T PLATE



without centralizer | with centralizer | External

"T" Type cover plates give a diameter reading directly across the hole. For I.D.'s smaller than $\frac{5}{16}$" (special jaws required) only two contacts are used. For larger holes, a third contact may be used as a side-stop or centralizer. "T" plates optional on Model 36B-6 and regularly furnished on 36B-15.

V PLATE



measures diameter indirectly | Internal | External

On "V" Plates, three jaws are used and the measurement is made of the distance between the sensitive contact and the chord formed by the two reference contacts. This measurement bears a direct relationship to the diameter and compensation is made by a special indicator so that the true diameter may be seen directly on the dial. "V" plates optional on Model 36B-6 and available at extra cost for Model 36B-15. All "V" plates are self-centralizing.

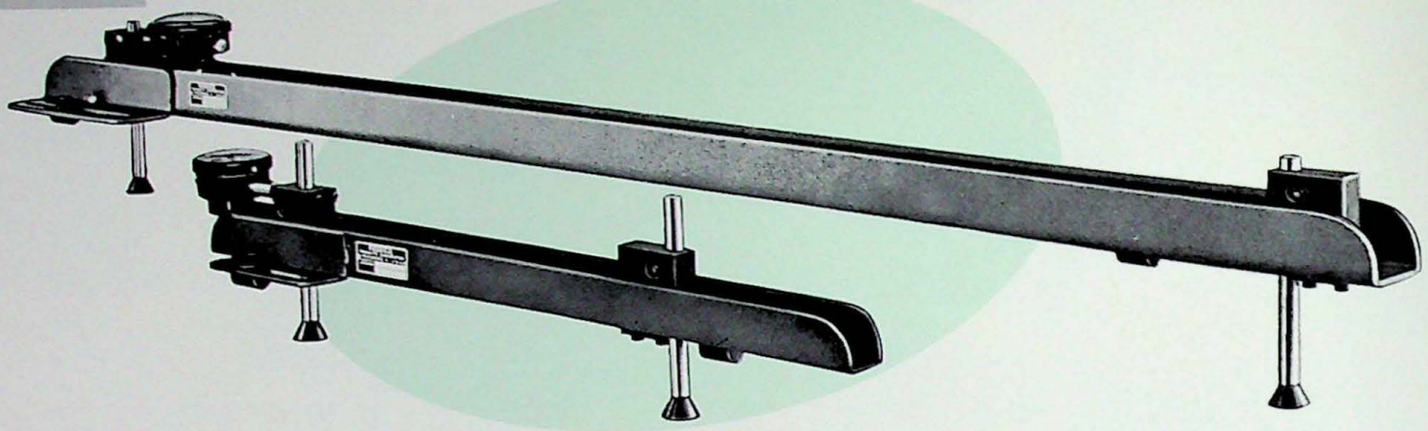
INSIDE – OUTSIDE DIAMETER GAGE

MIRACLE MOVEMENT
DIAL INDICATORS

ANY INSIDE OR OUTSIDE DIAMETER between 6" & 42"
(Longer lengths available)

SERIES 88P-100

LOW COST, FULLY ADJUSTABLE SHALLOW DIAMETER GAGES



The 88P-100 Series of I.D.-O.D. shallow diameter Gages are low in cost and provide accurate, dependable gaging for all diameters from 6" to 42".

Of channel construction, all six models are adjustable over six full inches for both I.D. and O.D. The gaging depth is adjustable up to three inches. The depth adjustment is made with the contact rods which are locked with AGD style locking screws.

The sensitive gaging contact is mounted in a reed pantograph block so that its motion is transferred to the Dial Indicator with no loss of accuracy due to friction. This construction also protects the Dial Indicator stem from side thrust. The block holding the reference contact slides in a slot to provide the six inch capacity for each model. After the desired size is reached the block is secured by double sets of lock screws. The rest button on the reference contact end is on the Gage centerline so that it lines up with the gaging contacts. This provides accurate seating on the proper diameter.

Made of steel, the Gage frame is sturdy and rigid for accurate gaging yet light in weight because of the channel construction. The Gages are ordinarily equipped with .0005", plain bearing Dial Indicators (B5M for Model 88P-101, C5M on other models) but .001" or .0001" Indicators are available if desired. Special contacts and/or rest buttons can be furnished for particular jobs.

SPECIFICATIONS

	88P-102 to 106	88P-101
INDICATOR — Model	C5M	B5M
Minimum Graduation	.0005"	.0005"
Range*	.030"	.030"
Dial-Balanced	0-15-0	0-15-0
Contacts	Hardened Steel (.750 dia.)	
Rest Buttons	Hardened Steel (.500 dia. .750 long)	
Gage Capacity	(See Table)	
Gaging Depth	Adjustable 0-3"	
Weight	From 3 to 10 lbs. depending on model	

*Corresponds to "Range of sensitive contact".

Capacity	Model No.	Capacity	Model No.
6-12"	88P-101	24-30"	88P-104
12-18"	88P-102	30-36"	88P-105
18-24"	88P-103	36-42"	88P-106

ADJUSTABLE MASTER AVAILABLE
See page 44

WHEN ORDERING, PLEASE SPECIFY:

1. Type of Measurement (I.D. or O.D.)
2. Gaging Diameter and Depth
3. Tolerance of work to be measured.

OPTIONAL AT ADDITIONAL COST:

1. Contacts — Tungsten Carbide
   — Special Shapes
2. Retraction — Greater than .030"
3. Gages for diameters greater than 42"
4. Rest buttons — Special sizes
5. Clearance — Special frames to provide additional clearance.

FULL JEWELED

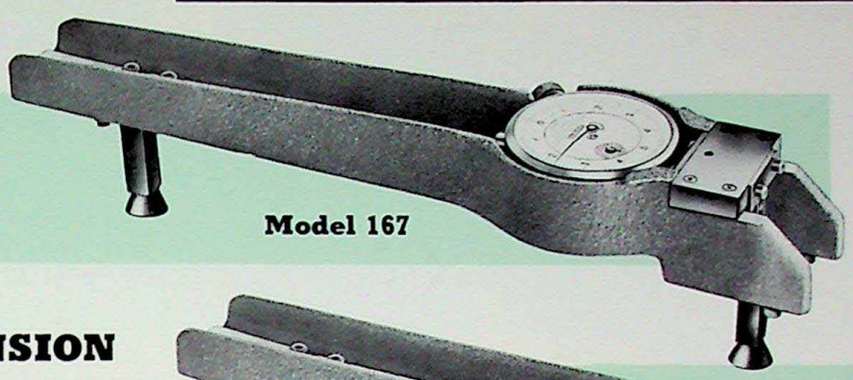
MIRACLE MOVEMENT

DIAL INDICATORS

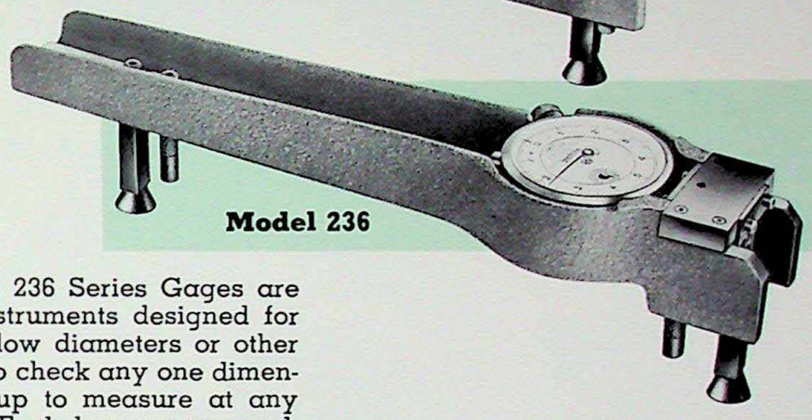
INSIDE GAGE | OUTSIDE GAGE

SERIES 167 and 236

ANY INSIDE DIAMETER between 3" & 24"



Model 167



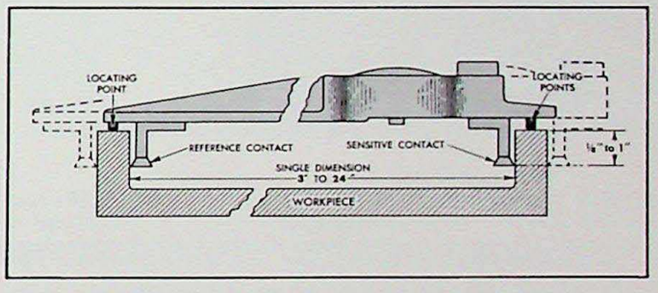
Model 236

ANY OUTSIDE DIAMETER between 3" & 24"

SINGLE DIMENSION GAGES

The I.D. Model 167 and O.D. Model 236 Series Gages are ruggedly built, single dimension instruments designed for rapid, reliable measurement of shallow diameters or other dimensions. Each gage is furnished to check any one dimension between 3" and 24" and set up to measure at any desired depth between ⅛" and 1". Each has a coarse adjustment for setting to approximate size on a master. Fine adjustment is accomplished by setting the adjustable Indicator dial.

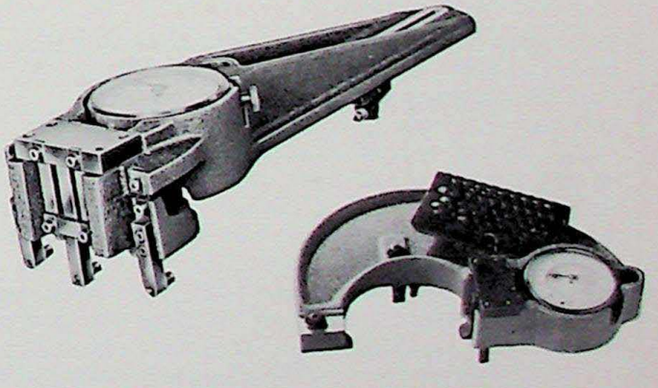
These gages seat on surfaces of the workpiece on three uniformly set rest buttons which accurately position contacts at correct depth and perpendicular to surface being measured. True diameter or length is found by "rocking" gage slightly from side to side. Dimensional variation is transferred from contact to indicator by a frictionless unit which also absorbs side thrust and shock, thus protecting the indicator from damage.



CENTRALIZING AND C FRAME TYPES

To meet special requirements, Series 167 and 236 Gages can be furnished with spring loaded centralizing contacts to provide self-alignment or can be constructed with C Frames so the gage can reach around centrally located obstructions to make diameter measurements. Centralizing type gages are available in either single dimension or adjustable models. C Frame type gages are quickly located on the workpiece by means of an adjustable backstop.

Sample workpiece, blueprint and specifications should be submitted so that design will be optimum for the particular job.



SPECIFICATIONS (Both Models)

INDICATOR — Model	C21
Minimum Graduation	.0001"
*Dial (Balanced & Adjustable)	0-5-0
CONTACTS (Sensitive & Reference)	Hardened Steel
GAGE CAPACITY	Any single dimension between 3" and 24"
GAGING DEPTH — Minimum	⅛"
GAGING DEPTH — Maximum	1"

Note: *Indicator Model C5M (.0005" grads.) can be supplied, when specified, at lower cost.

*With Revolution Counter.

WHEN ORDERING:

Please specify:

Whether centralizing or non-centralizing type of gage required.

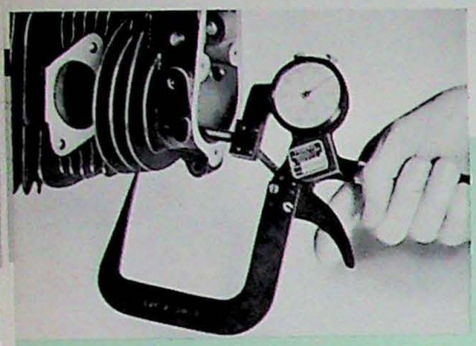
And send blueprint or sketch showing

1. **Dimension and Tolerance of work**
2. **Rest pin circle diameter**
3. **Gaging Depth**
4. **Any obstruction or interferences**

If possible, please send sample workpiece also.

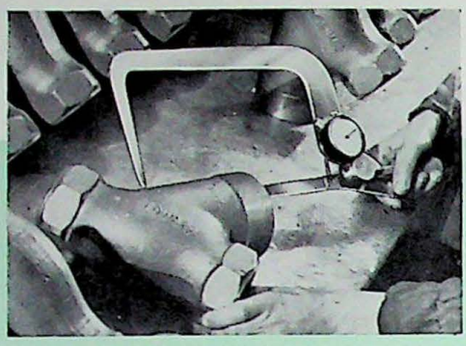
MODEL 49P-255

Jaw fits between fins of airplane cylinder to check wall thickness.



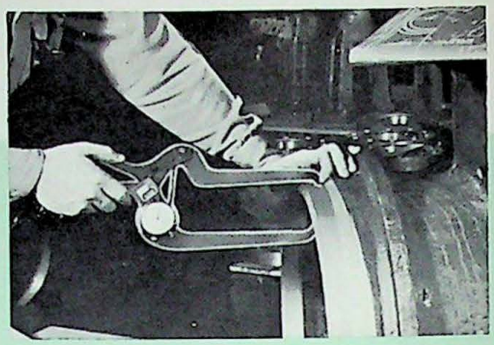
MODEL 49P, SPECIAL

Checks wall thickness at various points on valve bodies. Jaws designed to clear flanges.

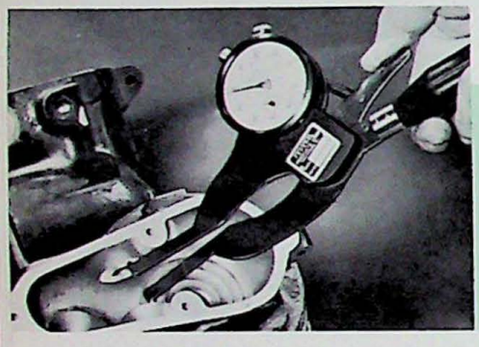


MODEL 49P, SPECIAL

Checks wall thickness in front of flange on large valve housing.

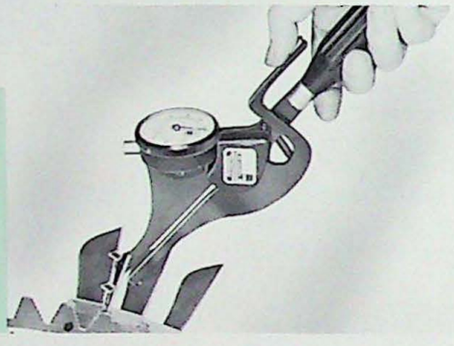


SIMPLE, EASY MODIFICATION SHAPES THE JAWS TO SUIT THE WORK FOR FAST, EFFICIENT GAGING OF UNUSUAL DIMENSIONS



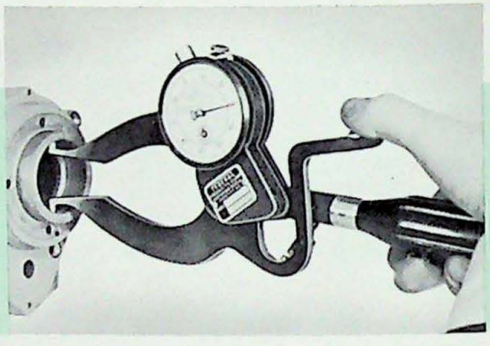
MODEL 149P-212

Jaws were designed to check spacing between bosses but are also suitable for various I.D.'s.



MODEL 149P-549

Checks spacing of blades on jet turbine. Stop on upper arm provides correct reference.



MODEL 149P-333

Used to make rough inspection of plain and recessed diameters of casting.

SPECIFICATIONS

Outside Measurement

GAGING CAPACITY	GAGING DEPTH	INDICATOR GRAD. (MIN.)	INDICATOR DIAL	MODEL NO. OF GAGE
0" to 3"	0" to 4"	*.010"	0-1000	49P-1
0" to 2"	0" to 8"	.001"	0-100	49P-198
0" to 3"	0" to 8"	*.010"	0-1000	49P-200
0" to 2"	0" to 4"	.001"	0-100	49P-172

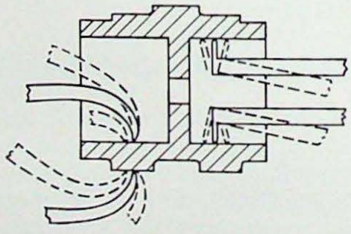
Inside Measurement

1" to 3"	0" to 3"	*.010"	0-1000	149P-20
1" to 3"	0" to 3"	.001"	0-100	149P-925

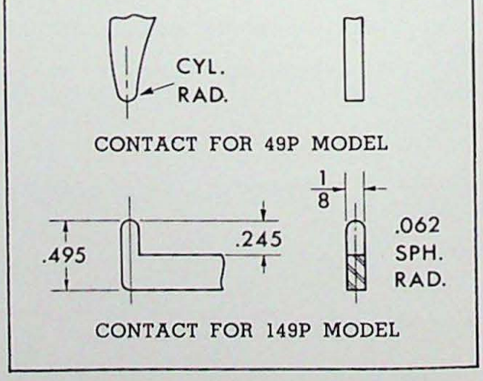
*1/64" graduations can be furnished at no additional cost — All Models are furnished with continuous, adjustable dials with revolution counters.

WHEN ORDERING:

1. If stock Model required (see Specifications), please specify Model Number of Gage.
2. If special contact arms, greater gaging capacity, or other modifications are required, please send blueprint, accurate sketch, or sample workpiece.
3. If fractional type calibration is desired (available on some Models — see Specifications), please specify. Otherwise indicator having decimal type calibration will be furnished.



For I.D. or O.D. measurement — Rock the gage slightly to position the contacts squarely across the desired dimension as determined by MINIMUM reading on the dial.



CONTACTS FOR STOCK MODELS 49P & 149P. Dimensions shown are for contacts regularly furnished on stock model 49P and 149P caliper gages. Special contacts and/or arms are available on request.

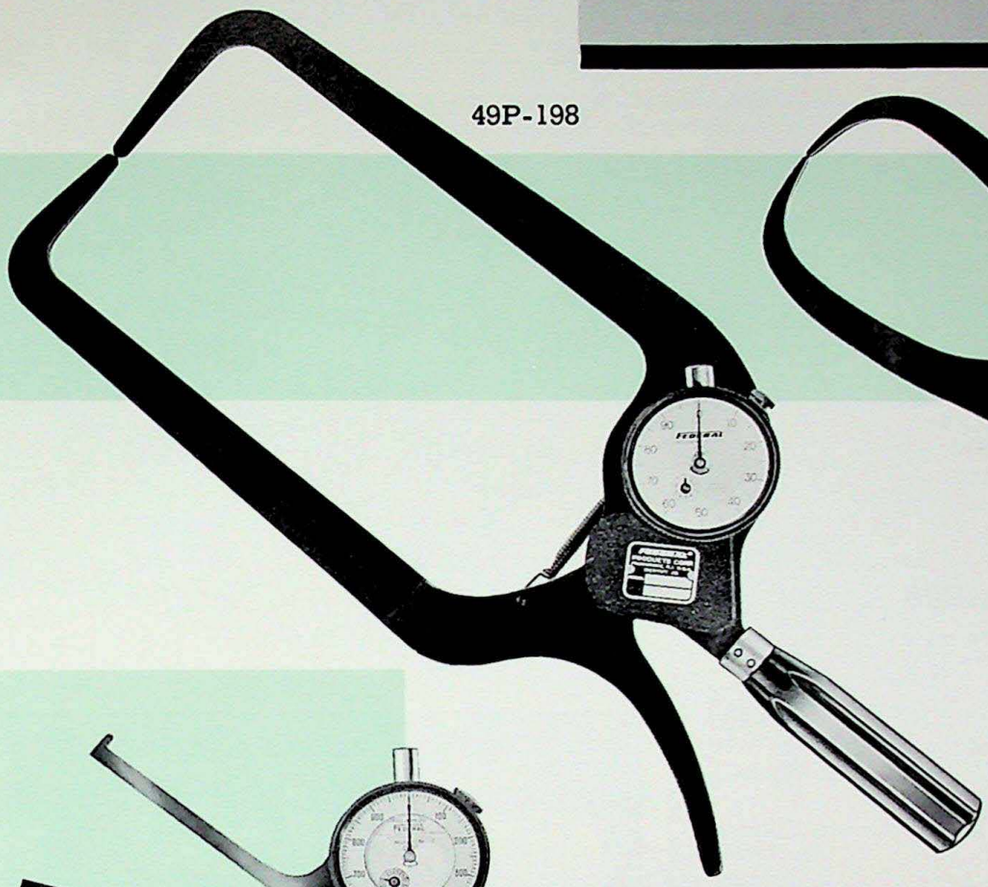
CALIPER GAGES

SERIES 49 and 149

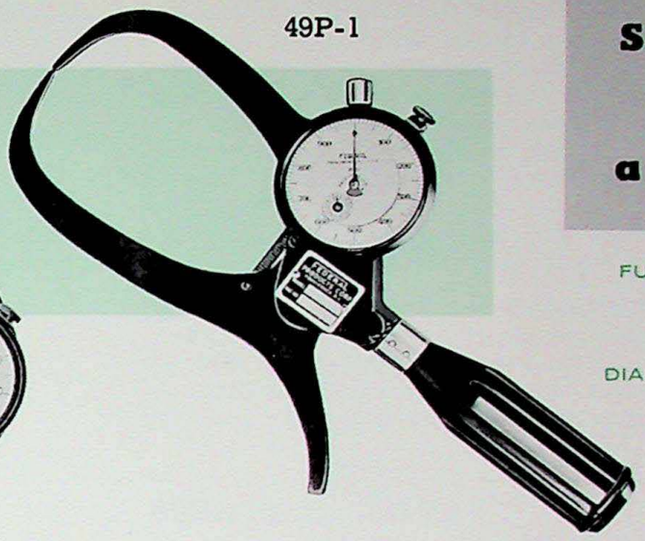
FULL JEWELED MIRACLE MOVEMENT DIAL INDICATORS

OUTSIDE MEASUREMENT

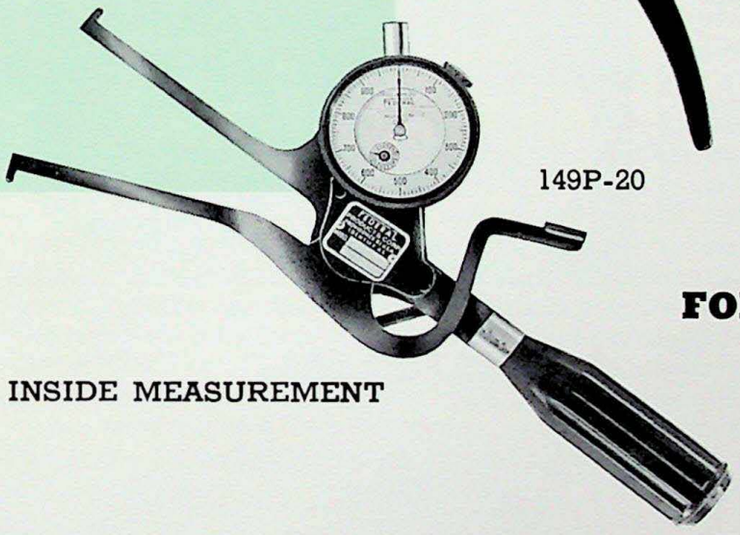
49P-198



49P-1



149P-20



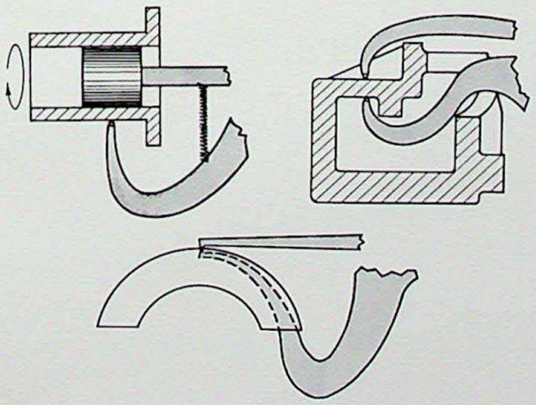
INSIDE MEASUREMENT

FOR COMPARATIVE MEASUREMENT OF DIFFICULT DIMENSIONS

Series 49 and 149 Caliper Type Indicating Gages, widely known for their ease of operation and ability to measure difficult dimensions, are among the most popular gaging instruments in use today. They are fast, handy, and convenient to use in checking patterns, castings, forgings, dies, sheet material, plastics and a wide variety of finished products. Economically priced and widely adaptable within their accuracy range, these gages are ideal for quick measurement of medium tolerance dimensions. Thus, they make it economically possible to hold good quality standards on work which might otherwise go unchecked.

As the accompanying illustrations suggest, Series 49 and 149 Gages have innumerable design possibilities. Specially shaped arms of various lengths can be designed to reach inaccessible spots or get around obstructions to make positive measurement of hard-to-get-at dimensions.

Operation is fast and foolproof. Lever action retracts the sensitive contact arm. Measurement is transferred to the indicator by means of accurately machined gears. Slight rocking of the gage enables it to locate properly for reading the true dimension.



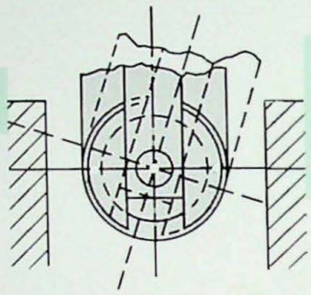
ODD SHAPED JAWS FOR UNUSUAL APPLICATIONS

The variety of jaw shapes which can be easily designed is almost limitless. They permit measurements which in many cases are impractical or impossible with any other type of gage.

FOOLPROOF CENTRALIZATION

Rather than employing two separate centralizing plungers which may respond unequally to a common source of pressure, thereby making centralization inaccurate, the 1250 Series Gages combine these into a single, large, spherically radiused plunger which contacts the circumference of the hole at two points. Generous bearing surfaces assure precise movement of the plunger so that unified pressure is exerted equally at each point of contact causing the gaging head to seat with greater and more dependable accuracy on the true diameter of the hole.

The sensitive and reference contacts of each gage are radiused, at time of assembly, to be precisely concentric with the plunger. The accuracy of this arrangement is much greater than that which can be realistically obtained by attempting to align a sensitive contact with two separate plungers. Because of this the Series 1250 Gages WILL HOLD ACCURATE CENTRALIZATION, even when the gage is unintentionally cocked laterally.



Points of contact (white dots) don't shift when gage is cocked.

SPECIFICATIONS

INDICATOR
- Model RC2I
- Minimum Graduation ..... .0001"
- Dial (Balanced, Adjustable, and with Revolution Counter) 0–5–0

METRIC INDICATOR (graduated .002 mm.) RP1I

CENTRALIZER ..... Hardened Steel

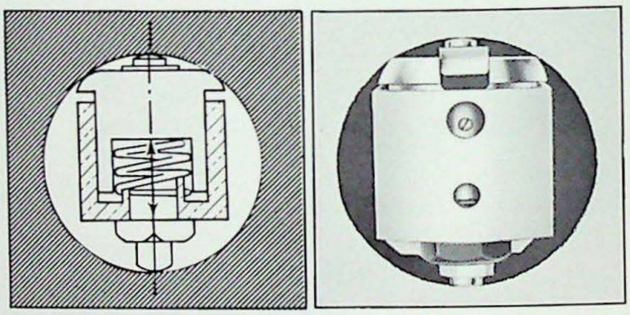
CONTACTS (Sensitive & Reference)
- Material ..... Tungsten Carbide
- Dimensions ..... (See Table)

RANGE OF SENSITIVE CONTACT ..... .025"

GAGE CAPACITY ..... (See Table)

GAGING LENGTH ..... (See Table)

WEIGHT (Approx.) Varies with Model ..... 12 to 26 oz.



1250 Series Gages provide foolproof centralization. Single plunger eliminates unequal centralizer response, permits more precise alignment of centralizers and sensitive contact. See explanation.

MODEL NO.	CAPACITY	Capacity of Each Extension	GAGING LENGTH	Distance from Contact to End	Sensitive Contact	Reference Contact Radius
1250P-1	.500"–1.00" (Requires 4 Extensions)	.500"– .625" .625"– .750" .750"– .875" .875"–1.00"	4"	11/64"	.062"	.078"
1250P-2	1.00"–2.00" (Requires 3 Extensions)	1.00" –1.33" 1.33" –1.67" 1.67" –2.00"	4 1/4" and 7 1/4"	11/32"	.125"	.125"
1250P-3	2.00"–4.00" (Requires 4 Extensions)	2.00" –2.50" 2.50" –3.00" 3.00" –3.50" 3.50" –4.00"	7 1/4" and 13 1/4"	13/32"	.125"	.375"
1250P-4	4.00"–8.00" (Requires 4 Extensions)	4.00" –5.00" 5.00" –6.00" 6.00" –7.00" 7.00" –8.00"	7 1/4" and 13 1/4"	13/32"	.125"	.500"

The reference contact is integral with each extension on Model 1250P-1, but on other Models may be removed for use on more than one extension, if required. Regular price of each Model includes a sturdy metal case together with one extension and necessary wrenches. Additional extensions are extra. Special contacts and gaging lengths can be furnished at additional cost.

WHEN ORDERING:
1. Please specify Model Number
2. Extension required
3. Gaging Length

AVAILABLE AT ADDITIONAL COST:
1. Other Gaging Lengths
2. Additional extensions
3. Special contacts
4. Tungsten Carbide centralizer

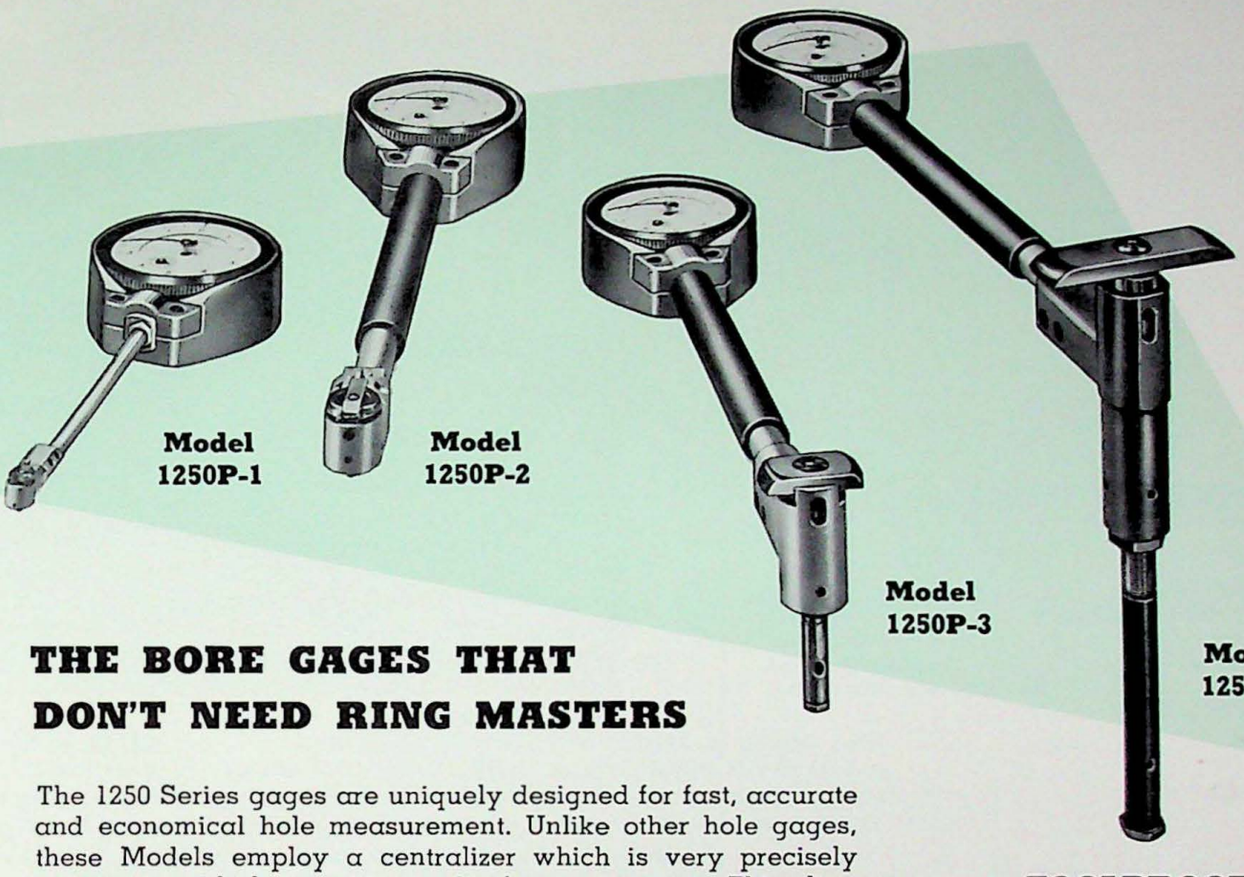
UNLESS OTHERWISE SPECIFIED:
1. Models 1250P-2, 3, and 4 will be furnished in 7 1/4" gaging length.
2. Gage will have Indicator with English graduations

Use FEDERAL Masters. See page 45

FULL JEWELED
MIRACLE MOVEMENT
DIAL INDICATORS

HOLE GAGE

SERIES 1250



Model 1250P-1

Model 1250P-2

Model 1250P-3

Model 1250P-4

INSIDE DIAMETERS ½" to 8"

THE BORE GAGES THAT DON'T NEED RING MASTERS

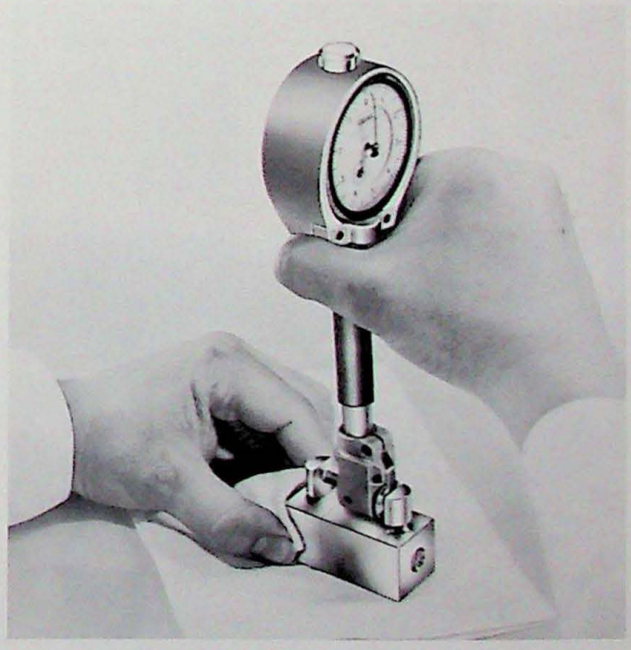
The 1250 Series gages are uniquely designed for fast, accurate and economical hole measurement. Unlike other hole gages, these Models employ a centralizer which is very precisely concentric with the sensitive and reference contacts. This eliminates having to rock the gage laterally to obtain centralization (see explanation on opposite page). Also, it permits mastering to gage blocks or micrometer and the setting transferred to the hole without loss of accuracy. The resulting increase in gaging speed and elimination in master costs not only make the 1250 Series preferred over the other makes of dial bore gages, they also make them the logical choice over air gages for many hole gaging applications.

- **FOOLPROOF CENTRALIZATION**
- **EXCEPTIONAL ACCURACY**

NEW FEATURES

Despite their high sensitivity and precision, the 1250 Series gages have proven their ability to withstand hard shop usage. Several new features have been introduced to further strengthen this ability. The indicator uses a new, all aluminum case with heavy duty construction, providing added strength and lighter weight. A new protective housing, made of plastic, gives greater protection against shock and hand temperature effects than the former aluminum housing while providing lighter weight for better balance. This new arrangement permits easier disassembly for cleaning and provides 1¼" greater length.

There are additional features which make the 1250 Series clearly superior to other hole gages. Each Model has a wide range of adjustment. Only four Models cover all diameters from ½" to 8". Gaging contacts are tungsten carbide. Motion transfer operates in jeweled bearings for almost complete elimination of friction. And operating range is .025" . . . great enough so that the gage can be used for both roughing and finishing operations without resetting.

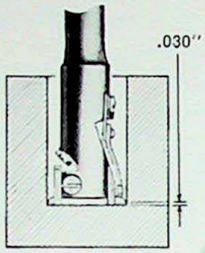


The 1250 Series gages, unlike most hole gages, can be mastered to gage blocks or micrometer without loss of accuracy because the radiused centralizer is so accurately concentric with the gaging contacts.

EXTENSIONS

For Models 1201P-0, and 1201P-1. The Diamond Tipped reference point is built into and is integral with each extension.

For Models 1201P-2 thru 1201P-6. The Diamond Tipped reference point is removable and can be interchanged with extensions of various lengths.



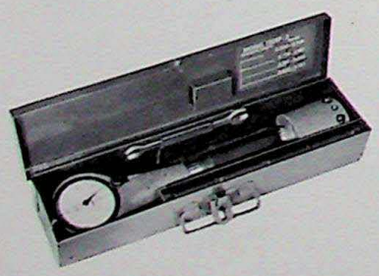
BLIND HOLE MODELS

The design of these Models is the same as that of the Regular Models in the 1201P Series, except for modification of the gaging contacts which permit readings to be taken within .030" of the bottom of blind holes. Specifications are the same as for Regular Models, except that the sensitive and reference contacts are chrome-plated steel. These Models are made to order.

SPECIFICATIONS

INDICATOR	
English Model	C1K
Minimum Grad.	.0001"
Dial (Balanced & Adjustable)	0-4-0
Metric Indicator (graduated .002 mm.)	P11
CONTACTS	
Sensitive and Reference	Polished Diamond
Locating	Hardened & Polished Steel
RANGE OF SENSITIVE CONTACT	.008"
GAGE CAPACITY	See table
WEIGHT (Approx. — Varies with Model)	13 to 48 oz.

MODEL	Total Capacity with All Extensions	Capacities Covered by Each Extension	Gaging Lengths	Distance From Contact to End
Portable 1201P-0 Bench 1201B-30	.500" to .750" Requires 4 Extensions	.500 to .562" .562 to .625" .625 to .687" .687 to .750"	3"	.11"
Portable 1201P-1 Bench 1201B-31	.750" to 1.250" Requires 4 Extensions	.750 to .875" .875 to 1.000" 1.000 to 1.125" 1.125 to 1.250"	3" or 6"	.33"
Portable 1201P-2 (Bench special)	1.250" to 2.250" Requires 4 Extensions	1.250 to 1.500" 1.500 to 1.750" 1.750 to 2.000" 2.000 to 2.250"	3" or 6"	.32"
Portable 1201P-3 (Bench special)	2.250" to 4.125" Requires 4 Extensions	2.250 to 2.719" 2.719 to 3.187" 3.187 to 3.656" 3.656 to 4.125"	6" or 12"	.31"
Portable 1201P-4 (Bench special)	4.000" to 10.000" Requires 5 Extensions	4.000 to 5.333" 5.333 to 6.666" 6.666 to 8.000" 8.000 to 9.333" 9.333 to 10.000"	6" or 12"	.44"
Portable 1201P-6 (Bench special)	6.00" to 12.665" Requires 2 Extensions	6.000 to 9.330" 9.330 to 12.665"	6" or 12"	.44"



PROTECTIVE CASE

Furnished with each stock model gage. Special for Bench Models and Portable Models having insulated handle and/or special lengths.

INSULATED HANDLE

Furnished upon request for any Portable Model without additional cost.

WHEN ORDERING, PLEASE SPECIFY:

1. Model Number of Gage
2. Extension Required
3. Gaging Length desired

UNLESS OTHERWISE SPECIFIED:

1. 6" Gaging Length will be furnished (except for Model 1201P-0 which has 3" Length only).
2. Gage will have English Model Indicator

OPTIONAL AT NO ADDITIONAL COST:

1. Reference & Sensitive Contacts of Tungsten Carbide (Hardened steel reference and sensitive contacts available also — except on Models 1201P-0 and 1201P-1).
2. Insulated Handle

AVAILABLE AT ADDITIONAL COST:

1. Extensions for additional capacities
2. Portable or bench Models having lengths and/or ranges other than those listed
3. Protective Cases for Bench Models and Portable Models having insulated handles and/or special lengths.

Use FEDERAL Masters. See page 45

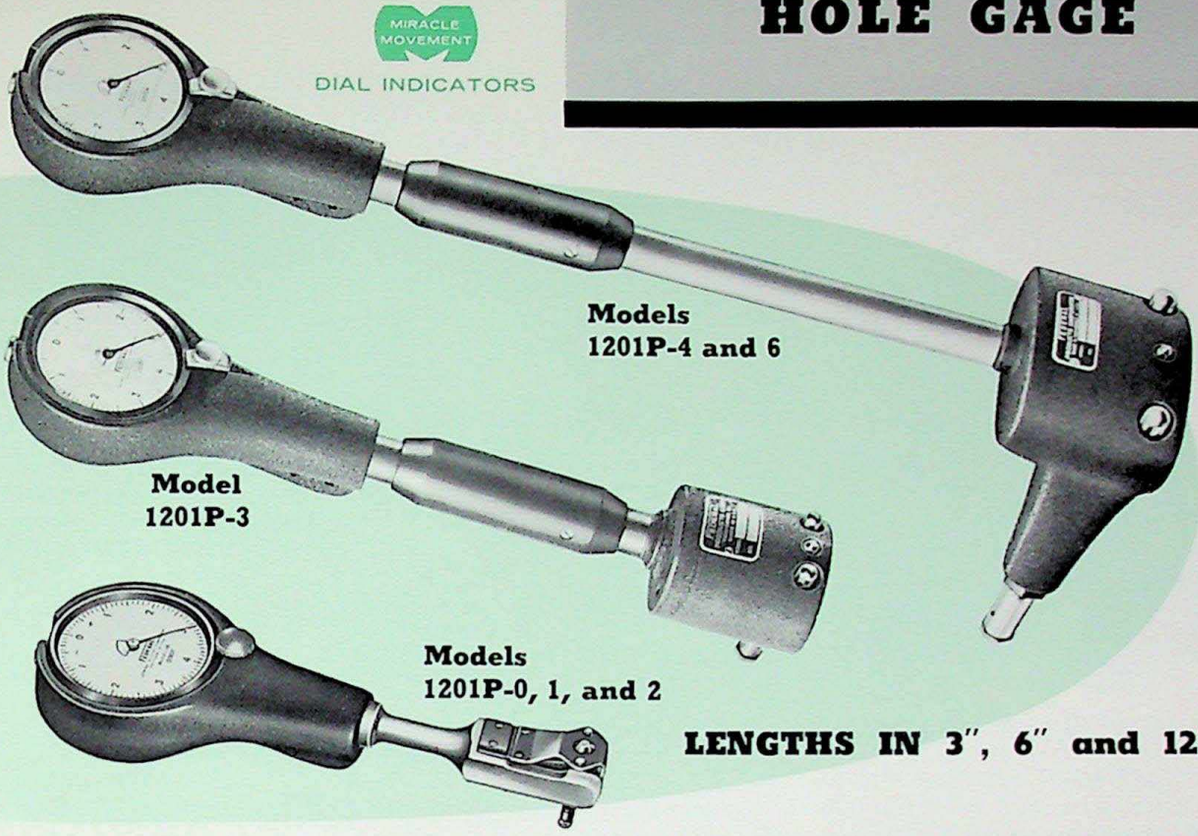
FULL JEWELED

MIRACLE MOVEMENT

DIAL INDICATORS

HOLE GAGE

SERIES 1201



Models 1201P-4 and 6

Model 1201P-3

Models 1201P-0, 1, and 2

LENGTHS IN 3", 6" and 12"

DIAMETERS from .500" to 12.665"

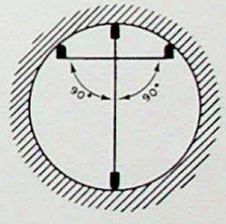
Other diameters and lengths available

One of the most popular and reliable Hole Gages in existence today, the Series 1201 gage achieves its high sensitivity and accuracy by virtue of almost friction-free operation. Measurement is transferred smoothly from contact to indicator by frictionless pantograph spring. Centralizing operates on the same principle. The result is a gage which locates easily and quickly, has a "good feel". Even the newcomer to gaging has no difficulty in obtaining accurate and reliable measurements right from the start.

Gages quickly reveal taper, out-of-round, camber, bell-mouth and other irregular conditions.

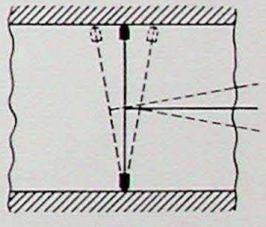
Equipped with diamond tipped reference and sensitive contacts that defy wear, the 1201 is available in several different lengths and a variety of capacities (see chart). Gages having other lengths and capacities, as well as variations in gaging head design can, of course, be supplied to meet special requirements. Note too that, when gage is being zeroed to master, its adjustable dial may be set to proportion travel above and below the nominal dimension as desired. With dial in normal position, travel will be minus .005", plus .003".

Sturdily built and sensitive to fine dimensional variation, the 1201 can be depended upon to maintain outstanding accuracy for a long time under constant use.



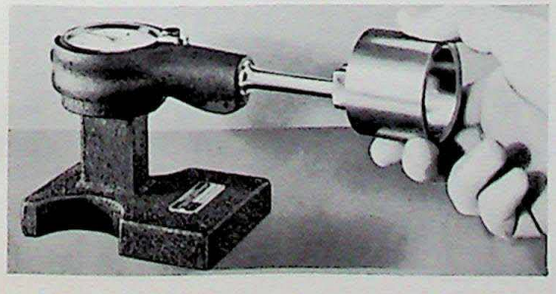
POSITIVE CENTRALIZATION

Centralizing contacts locate the measuring contacts centrally on the hole diameter.



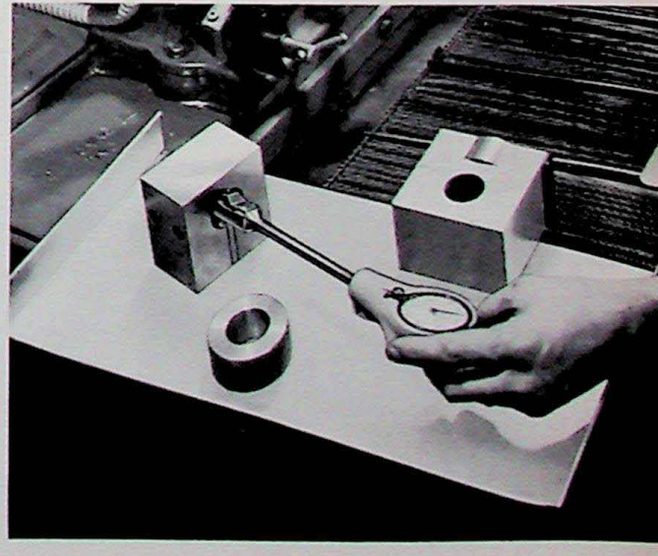
POSITIVE PERPENDICULAR LOCATION

Rocking gage slightly locates contacts squarely across hole as indicated by MINIMUM reading on indicator.



SEE the dimensional variation more quickly and easily with a 1201 than is possible with fixed or plug gages.

1201 Series Gages can be used at the bench when attached to stand. Easily removable for portable use when desired.

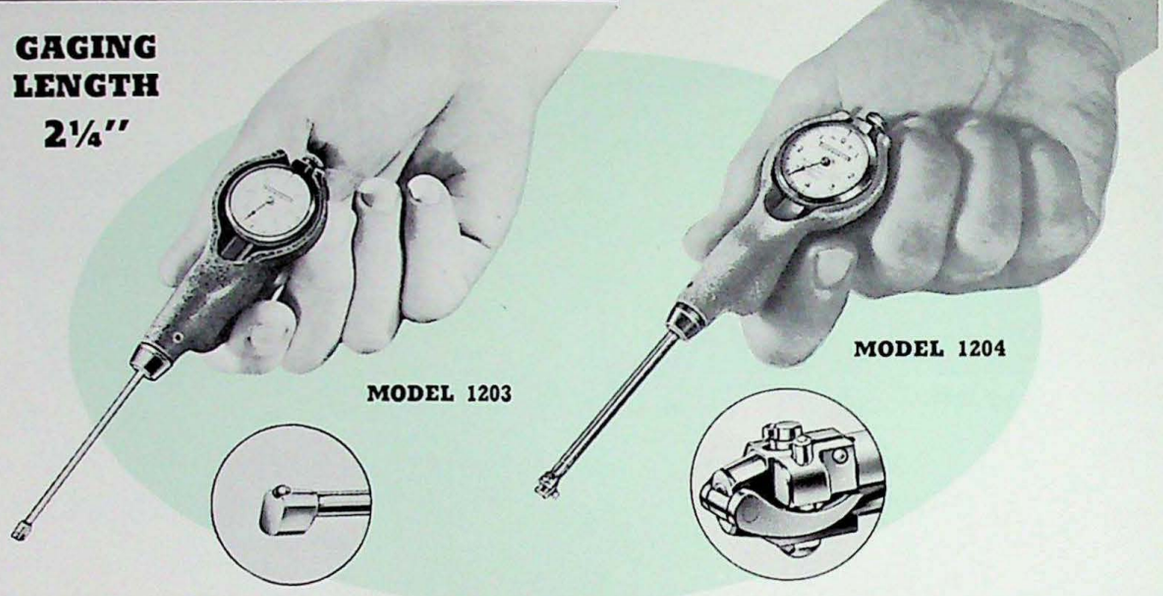


HOLE GAGES

MODELS 1203 and 1204

GAGING LENGTH 2¼"

INSIDE DIAMETERS from — .122 to — .506



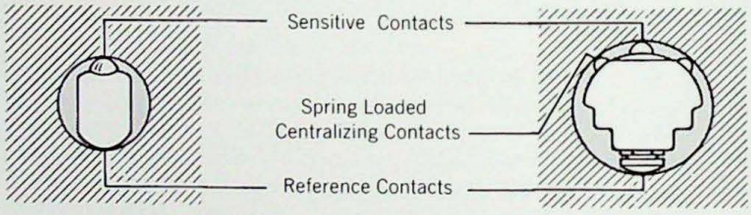
Companion Models to the 1201 Hole Gage (preceding page), the 1203 and 1204 combine sturdiness and compactness for ease and reliability in gaging small, hard to measure diameters. Both Models employ the Testmaster Dial Indicator, widely known for its high sensitivity and accuracy. Total measuring capacity of each Model is divided into 12 parts, provided for in Model 1203 by separate plugs which are quickly affixed to the body of the gage, and in the 1204 by interchangeable extensions for the gaging head.

Slight rocking motion of each gage produces accurate centralization. This is accomplished in Model 1203 by a combination of contact pressure and wide, properly radiused reference contact which forms part of the gaging head surface, and in the 1204 by means of accurately positioned centralizing contacts.

SPECIFICATIONS

INDICATOR	
Model T-2 Testmaster	
Minimum Grad.	.0001"
Dial	0-4-0
CONTACTS (Sensitive & Reference)	Chrome Plated Steel
RANGE OF SENSITIVE CONTACT	.008"
GAGE CAPACITY	See table
MAXIMUM GAGING LENGTH	2¼"
WEIGHT (Approx.)	4 oz.

Enlarged End View



1203

.122" — .255"

GAGING CAPACITY

(Covered by 12 Interchangeable Plugs)

Capacity Covered by Each Extension	Distance From Contact To End
.122"–.130"	.031"
.130"–.138"	
.138"–.146"	
.146"–.154"	
.154"–.162"	
.162"–.170"	
.170"–.178"	
.178"–.186"	
.186"–.202"	.047"
.202"–.218"	
.218"–.234"	
.234"–.255"	

1204

.245" — .506"

GAGING CAPACITY

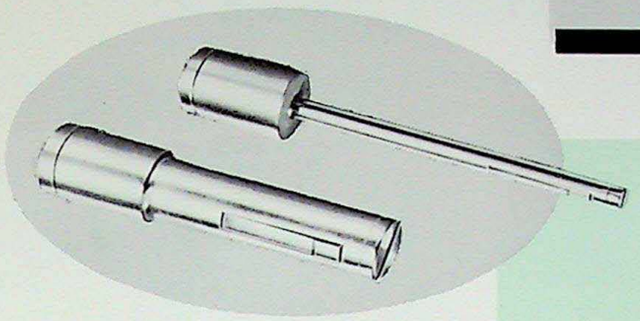
(Covered by 12 Interchangeable Extensions)

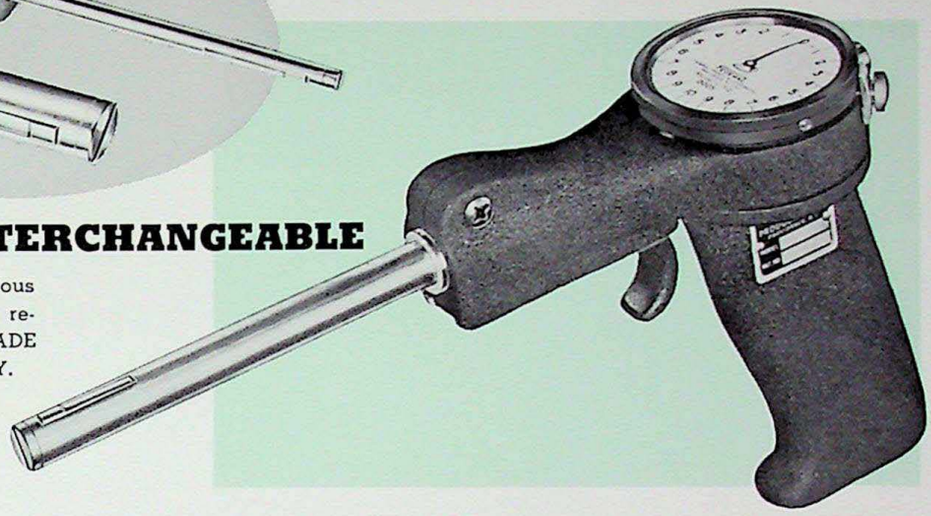
Capacity Covered by Each Extension	Distance From Contact To End
.245"–.253"	.146"
.253"–.261"	
.261"–.269"	
.269"–.277"	
.277"–.285"	
.285"–.293"	
.293"–.301"	
.301"–.309"	
.309"–.362"	
.362"–.412"	
.412"–.462"	
.462"–.506"	

Use FEDERAL Masters. See page 45

HOLE GAGE

SERIES 165





FULL JEWELED

MIRACLE MOVEMENT

DIAL INDICATORS

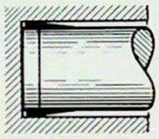
INSIDE DIAMETERS

from — 3/16"

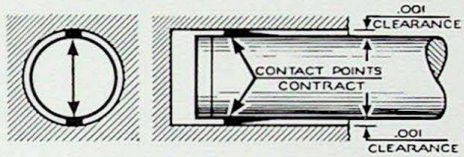
to — 1"

PLUGS ARE INTERCHANGEABLE

They can be furnished in various lengths and diameters to suit requirements. EACH PLUG IS MADE FOR A SINGLE DIAMETER ONLY.



Bottom of Blind Holes can be inspected with specially designed plugs. Prices on request.



PLUG is made approximately .002" smaller in diameter than the hole to be checked and acts as guide to properly position the diametrically opposite contacts for accurate measurement.

SINGLE DIMENSION PLUG TYPE GAGE

with Interchangeable Plugs

This self-centralizing, single dimension gage with handy pistol grip is particularly suited to checking diameter, bell-mouth, taper, and out-of-round of small holes, and finds greatest application for diameters between 3/16" and 1/2". The plug, which is made approximately .002" smaller than the diameter being checked, serves as a guide to quickly and accurately position the two diametrically opposite contacts in the hole (see diagram). These contacts are contracted by slight pressure on the trigger which, when released, allows them to expand simultaneously, exerting the proper gaging pressure for accurate measurement.

Price of the gage includes one plug made to check a specific diameter. Additional plugs may be ordered as extras for the same gage, since all plugs are easily interchangeable as the occasion requires. The maximum practical gaging lengths for plugs in various diameter groupings are listed to left.

Stop collars are available for controlling gaging depth. Made to individual specifications.

SPECIFICATIONS

INDICATOR	
Model	C3Q
Minimum Graduation	.0005"
Dial (Balanced, Adjustable)	0–10–0
Metric Indicator (graduated .005 mm.)	P3I
CONTACTS	
Material	Hardened and Polished Steel
Distance to end of plug	3/8"
RANGE OF SENSITIVE CONTACT	.012"†
GAGE CAPACITY	Any single dimension between 3/16" and 1"
GAGING LENGTH	See table
WEIGHT	15 ozs.

If diameter to be measured is —	*Gaging length will be
3/16" to 3/8" Inclusive	2 3/4"
Above 3/8" but not more than 5/8"	3 3/4"
Above 5/8" but not more than 1"	4 3/4"

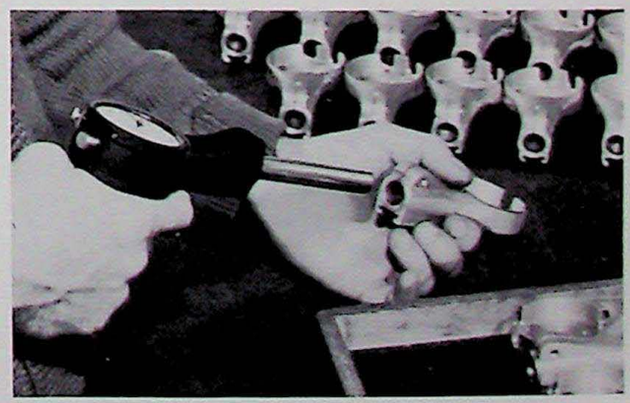
*Distance from Contact to Shoulder of Plug.
†.020" also available. No additional charge.

WHEN ORDERING:

Please list Model Number and specify exact diameter or diameters to be measured.

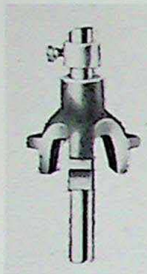
Unless otherwise specified, gage will be furnished with Indicator having English calibration.

If blind hole type plug is required, please forward blueprint of part to be measured.

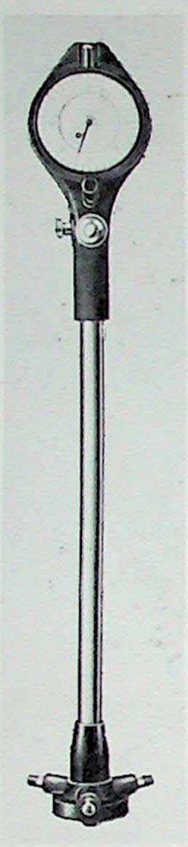


Use FEDERAL Masters. See page 45

VERTICAL MODELS B3F

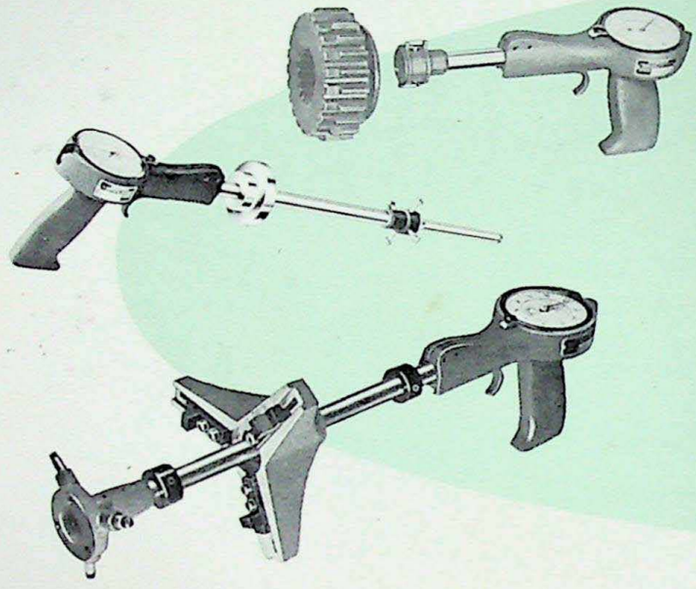


Model B3F Hole Gages are especially designed for gaging holes and recesses which are more easily inspected from a vertical position. They are similar to Model 1243 except for the special grip section and trigger button just below indicator. Model B3F Gages can be furnished with centralizers (extra on request) which engage lip of hole and maintain contacts perpendicular to hole axis. These gages are also adaptable to long gaging lengths. Regular price does not include wooden case.



EFFECTIVE ANSWERS TO DIFFICULT GAGING PROBLEMS

Model 1242, 1243 and B3F Hole Gages can be easily modified to fit special needs, greatly simplifying many difficult or unusual inside diameter measurements.



SPECIFICATIONS

English grad.	D6K	Dial	0–20–0
Minimum grad.	.0005"	(with Rev. Counter)	
Metric Indicator (graduated .01 mm.)			Q6I
CONTACTS			Hardened and Polished Steel
RANGE OF SENSITIVE CONTACT			See table
GAGE CAPACITY			See table
WEIGHT (Approx.)			2¼ to 3¼ lbs.

MODEL	Total Gaging Capacity*	Capacity of each Set of Cont.	Range	Gaging Length	Dist. Cont. Pt. to End of Head
1242P-1 1243P-1 B3FP-1	.670"—1.270" Requires six sets of Contacts (Diam.—.187")	.670"— .770" .770"— .870" .870"— .970" .970"—1.070" 1.070"—1.170" 1.170"—1.270"	.100"	1242P-1, 1243P-1 3" or 6"	7/16"
				B3FP-1 14"	7/16"
1242P-2 1243P-2 B3FP-2	1.250"—2.750" Requires six sets of Contacts (Diam.—.187")	1.250"—1.500" 1.500"—1.750" 1.750"—2.000" 2.000"—2.250" 2.250"—2.500" 2.500"—2.750"	.250"	1242P-2, 1243P-2 3" or 6"	15/32"
				B3FP-2 14"	15/32"
1242P-3 1243P-3 B3FP-3	2.750"—6.250" Requires seven sets of Contacts (Diam.—.250")	2.750"—3.250" 3.250"—3.750" 3.750"—4.250" 4.250"—4.750" 4.750"—5.250" 5.250"—5.750" 5.750"—6.250"	.500"	1242P-3, 1243P-3 6" or 12"	13/16"
				B3FP-3 14"	13/16"

*One set of Contact Points furnished with each gage. Other sets of contacts are extra.

WHEN ORDERING, please specify:

1. Model number
2. Capacity required
3. Gaging Length desired

(If requirements are special, please send blueprint and complete specifications.)

UNLESS OTHERWISE SPECIFIED:

6" Gaging length will be furnished

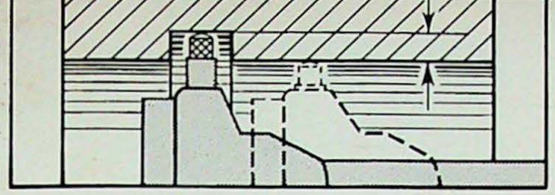
REGULAR PRICE INCLUDES:

Gage as specified above, with one set of contacts and, except for Model B3F, contained in protective wooden box.

OPTIONAL AT SLIGHT ADDITIONAL COST:

1. Contacts for additional capacities
2. Special design for extra retraction
3. Contacts of special shape or material
4. Special gaging lengths and modifications

Use FEDERAL Masters. See page 45

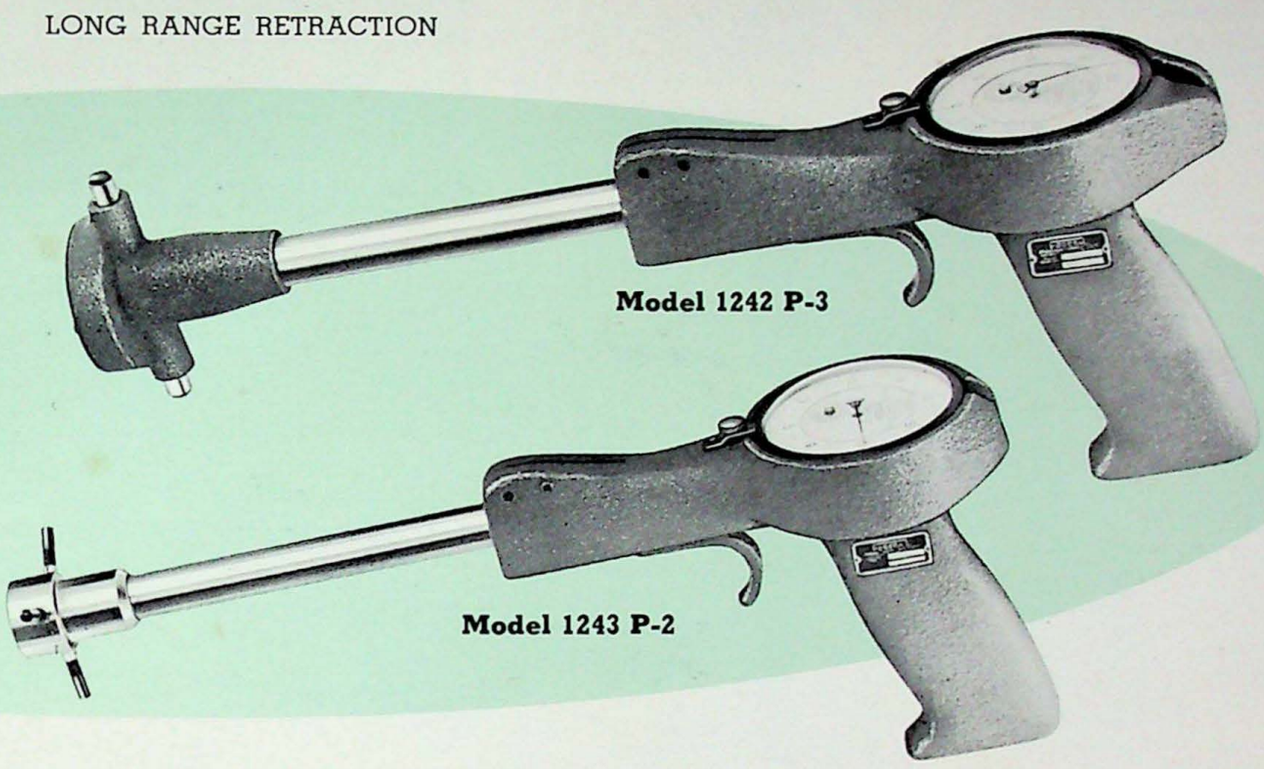


LONG RANGE RETRACTION

HOLE GAGES

SERIES 1242 and 1243

FULL JEWELED MIRACLE MOVEMENT DIAL INDICATORS



Model 1242 P-3

Model 1243 P-2

INSIDE DIAMETERS from — .670" to — 6.250"

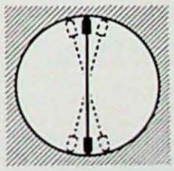
LONG RANGE HOLE GAGES WITH RETRACTING CONTACTS

The long range of contact retraction and the ease with which they lend themselves to modification have made the 1242 and 1243 Series extremely useful for a wide variety of inside measurements, particularly where plain or recess diameters must be checked at considerable depths. Model 1243 is recommended for determining out-of-round conditions.

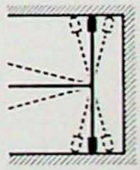
Contact points of various shapes or lengths are quickly interchangeable, permitting each gage to be used for several diameter sizes. These gages may be modified to incorporate extremely long lengths and have been applied to measurements at depths of 70 feet or greater. Trigger action retracts and expands contacts over a wide range, permitting them to engage grooves or recesses considerably greater in diameter than the hole in which the gage is inserted. Once the trigger is released, gaging pressure is exerted uniformly and in the proper amount for quick response. A slight rocking motion quickly secures the actual (minimum) diameter reading.

Exploration for taper, bell-mouth, out-of-round, and other dimensional variations is facilitated, by the use of centralizers which can be furnished at slight additional cost.

TWO POINT MODEL 1242

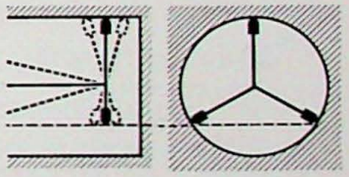


MANUAL CENTRALIZATION. A slight sidewise "rocking" motion is required to center the gage.

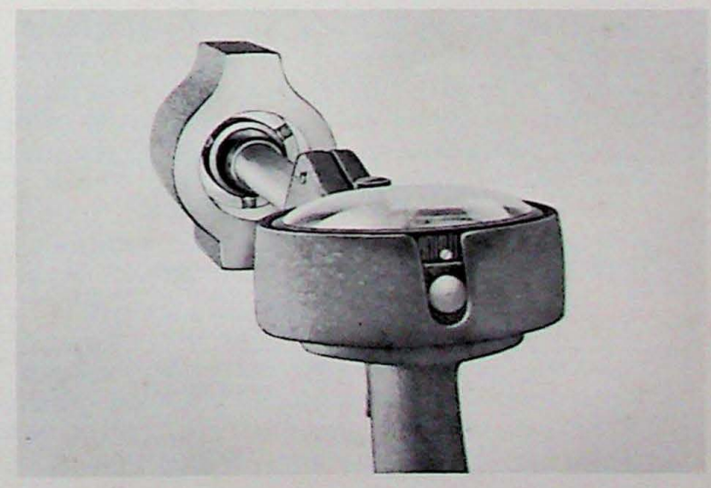


MANUAL PERPENDICULAR LOCATION. A slight "rocking" motion is required to obtain the minimum Indicator reading.

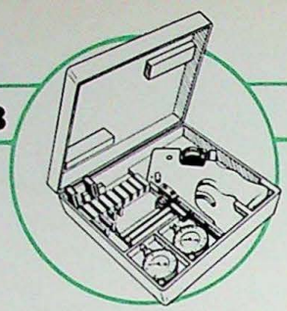
THREE POINT MODEL 1243 and B3F TYPE



POSITIVE CENTRALIZATION. All three contacts expand simultaneously and equally, thus locating gage centrally in the hole.



COMBINATION KIT - AT-23



Contains one Model 99P-12 Groove Gage, plus the necessary additional Indicators, sets of Jaws, wrenches etc., together with instructions for transforming it into either of the other two Models in the Series. This Combination Kit makes the regular capacities of all three gages quickly available at substantially less than the combined cost of the gages themselves.

Kit is contained in attractive wooden case which has space also for the 99P-10 Auxiliary Jaws (Sets B and C) which can be included as extra items.

Model 99P-10

NEW EXTENSION PLATE, PL-68

easily attached to any of these groove gages to extend capacity (see Specifications). Available from stock separately or substitute for regular plate when gage is furnished.

SPECIFICATIONS

	Dimension	99P-10 with Regular Jaws (Set A)	Auxiliary Jaws (Set B)	Auxiliary Jaws (Set C)	99P-11	99P-12
MAXIMUM GAGING DEPTH	D	1.250"	1.250"	1.250"	2.250"	3.250"
Contact Dimensions Thickness Length	 C E	 .030" .060"	 .050" .100"	 .060" .125"	 .060" .190"	 .090" .360"
RANGE OF SENSITIVE CONTACT		.050"	.050"	.050"	.075"	.100"
RANGE OF RETRACTION		.500"	.500"	.500"	.750"	1.00"
MINIMUM BORE Gage Can Enter	B	.437"	.437" @ .750 depth	.435" @ .875 depth	.671"	.812"
MINIMUM GROOVE DIAMETER That Can Be Checked	A-Min	.495"	.485"	.613"	.960"	1.375"
MAXIMUM GROOVE DIAMETER That Can Be Checked (Reg.)	A-Max	2.718"	2.750"	2.812"	3.687"	6.000"
MAX. DIA. Using Ext. Plate	A-Max	7.60"	7.68"	7.73"	9.00"	9.37"
DIAL INDICATOR Model Minimum Graduations Dial (Balanced, Adjustable)			B3Q .0005" 0-10-0		B3M .0005" 0-15-0	B3K .0005" 0-20-0
CONTACTS—Hardened Steel (Tungsten Carbide or Other Material furnished on Special Order)						

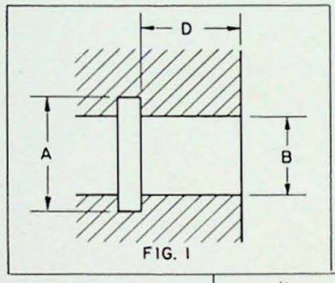


FIG. 1

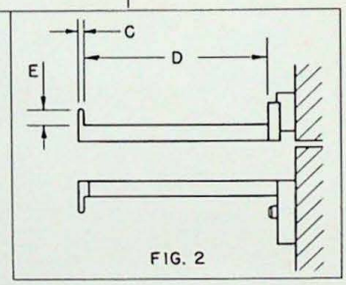


FIG. 2

TRUARC RING GROOVES

5000 Series	5001 Series	5002 Series	5008 Series	Correct Gage
50 thru 150	50 thru 145		75 thru 150	99P-10
156 thru 350		256 thru 334	156 thru 350	99P-11
306 thru 550			315 thru 400	99P-12

"O" RING GROOVE DASH NUMBERS

Dynamic Series	Static Series	Correct Gage
7 and 8		99P-10 with auxiliary Jaws, Set B
9 thru 14		99P-10 with auxiliary Jaws, Set C
15 thru 27	1 thru 15	99P-11
22 thru 60	1 thru 34	99P-12

HOW TO ORDER

If gage is to be used to measure TRUARC or "O" RING grooves and groove number is known, select proper Model by using tables to left.

OTHERWISE, using the Specification Table above.

1. **Determine which Models will gage at the maximum depth (Dimension D, Fig. 2) required by your specifications.**
2. **Select the contact dimensions (C and E, Fig. 2) which best suit the grooves you wish to check, allowing clearance suitable to your application.**
3. **Make sure that the gage selected will enter the minimum bore (Dimension B, Fig. 1) required by your specifications and that the dimensions to be checked fall within the gaging range (A-Min and A-Max) of that Model.**
4. **In the event that some modification is desirable or necessary in order to fit your requirements, please send a print or sketch which includes all pertinent dimensions.**

NOTE: Under certain conditions involving gaging depths which are less than the maximums listed, these gages will enter bores and measure groove diameters which are smaller than the minimum shown. Kindly consult us regarding such conditions.

INSIDE DIAMETER GROOVE GAGE

FULL JEWELED
MIRACLE MOVEMENT
DIAL INDICATORS

SERIES 99

Model 99P-11

Sensitive upper jaw is free of gage's weight and pressure of operator's hand; reacts accurately. Has long retraction movement.

Model 99P-12

Dimensions of hardened steel contacts were carefully selected to permit maximum gaging versatility.

Adjustable lower jaw is set at proper position on reference rail and locked. Supports weight of gage and operator's hand.

Contact and support arm are both reversible.

Long reference rail permits wide gaging capacity. Provides sturdy, accurate support for lower jaw.

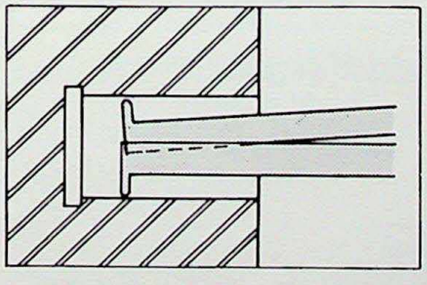
Correctly positioned trigger permits quick, easy retraction of upper (sensitive) contact.

Full jeweled Dial Indicator is equipped with Miracle Movement. Can be rotated 90° to right or left to suit convenience of operator.

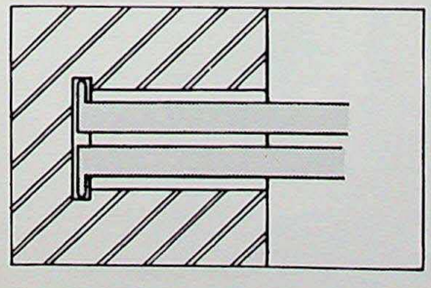
Revolution counter furnished on all models.

Lightweight aluminum frame with trigger finger control "feels right" to operator.

ADJUSTABLE, WIDE CAPACITY I.D. GROOVE GAGES



Sensitive contact retracted to enter bore.

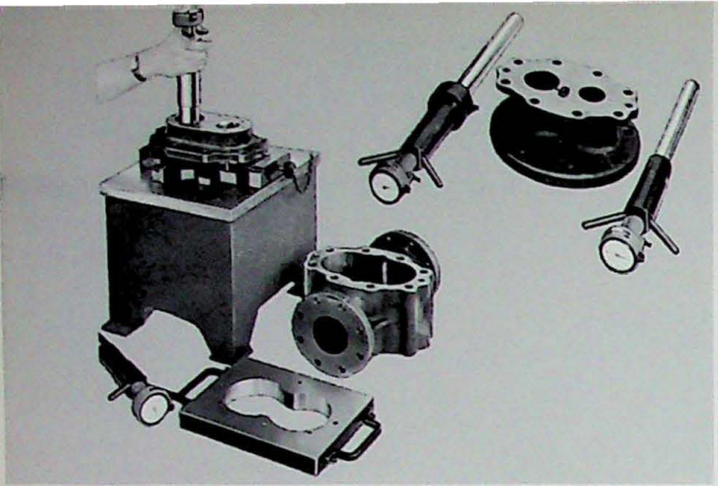


Sensitive contact, once released, centers on maximum diameter of groove.

Series 99 Gages permit exceptionally accurate diameter measurement of internal grooves, such as those provided for the insertion of Truarc Rings, "O" Rings, and similar sealing and retaining rings. Each of the three Models available from stock has exceptionally wide gaging capacity. Two alternate sets of jaws, available as extras for Model 99P-10, permit the gage to enter bores as small as .373" diameter to check grooves at slightly reduced gaging depths. They were designed primarily for the smaller size "O" Ring grooves (see table).

Series 99 Gages are very easy to use. The lightweight pistol grip handle, trigger control and wide retraction movement of the sensitive (upper) anvil permit contacts to be inserted and located rapidly. A slight rocking motion allows them to quickly reach true diameter position. Since all weight is supported by the reference (lower) anvil, the sensitive contact is free to exert constant, uninfluenced pressure against the work. Movement is transferred precisely to the Indicator by means of a lever moving on a ball bearing pivot. This arrangement greatly minimizes friction and virtually eliminates inertia and wear, thus assuring continuing accuracy.

The thickness and length of gaging contacts have been selected to permit greatest versatility as well as optimum use in measurement at the bottom of blind holes. Jaws are easily interchangeable and can be modified to suit individual requirements.



Squareness and location of holes in mating parts are checked to determine alignment for assembly. Parts are accurately positioned on fixture and gages reference through precision bushings. Alignment is determined to within .0001".

SPECIFICATIONS

INDICATOR	
Model*	J6K
Minimum Graduation	.0005"
Dial (Balanced & Adjustable)	0–20–0
CONTACTS	
Models 205P-1 through 205P-3	Hardened Steel
Models 205P-100 through 205P-104	Tungsten Carbide
REFERENCE TUBE	Hardened Steel, Precision Ground
GAGE CAPACITY	Each Model made to a single dimension (See Table below)
RETRACTING LEVER	Furnished on all Models except 205P-1, 205P-2 and 205P-3
HANDLES	Furnished on Models 205P-103 and 205P-104

*Model J1K (.0001" grads.) also available.

WHEN ORDERING STOCK MODELS, PLEASE SPECIFY:

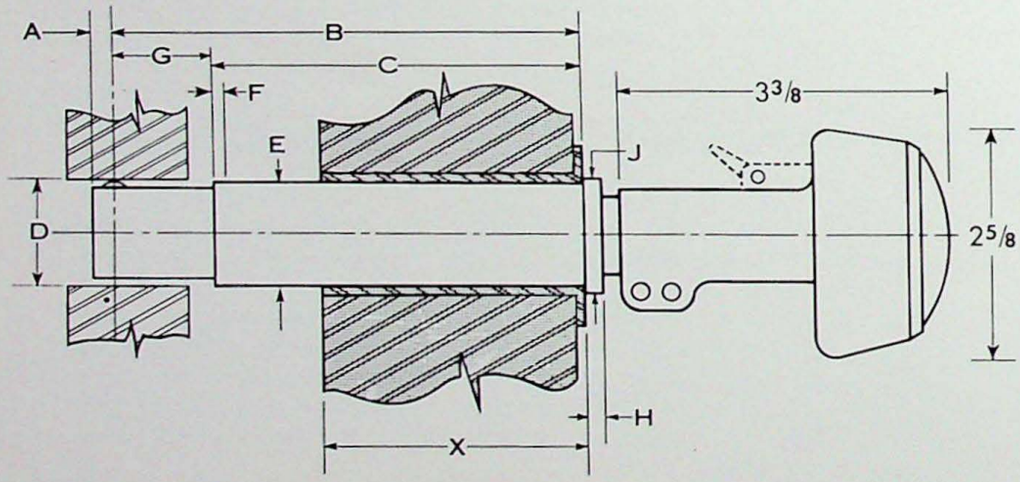
1. Model Number of Gage (See Table below).
2. Gaging Diameter (Designation "D").
3. Model Number of Indicator.

OPTIONAL AT ADDITIONAL COST:

1. Retracting Levers for Models 205P-1, 2 & 3.
2. Handles (except for Models 205P-103 & 104).

WHEN ORDERING SPECIAL MODEL, PLEASE SPECIFY:

1. All dimensions "A" through "X" in drawing, table and notes below.
2. Model Number of Indicator.
3. Special Conditions — Clearance, Fixture, Workpiece, etc.
4. Location of Sensitive Contact (side or end).
5. Any accessories desired.



A Distance from centerline of contact to end of gage head.
B Gaging depth; distance from bottom of flange to centerline of contact.
C Length of locating tube.
D Gaging diameter — TO BE SPECIFIED.
E Diameter of locating tube.
F Lead taper on locating tube; 1/4" per foot, 3/8" maximum.
G Gaging length of head; distance from end of locating tube to centerline of contact.
H Length of flange.
J Diameter of flange.
X MINIMUM recommended bushing length for Models listed.

MODEL	CAPACITY (inches)	RANGE OF SENSITIVE CONTACT	DIMENSIONS (inches)									
			A	B	C	D	E (Note 1)	F	G (Note 2)	H (Note 3)	J (Note 4)	X
205P-1	.1250 – .1559	.008	.031	4.31	4.00	Specify	.5006	5/16	.31	1.00	.750	2 1/8
205P-2	.1560 – .1869	.008	.039	4.31	4.00	Specify	.5006	5/16	.31	1.00	.750	2 1/8
205P-3	.1870 – .2339	.008	.047	4.31	4.00	Specify	.5006	5/16	.31	1.00	.750	2 1/8
205P-100	.2340 – .4999	.020	.093	5.00	4.00	Specify	.5006	5/16	.87	1.00	.750	2 1/8
205P-101	.5000 – .8749	.020	.093	6.00	5.00	Specify	.8757	1/4	.87	.25	1.250	2 1/2
205P-102	.8750–1.4999	.020	.125	8.00	6.50	Specify	1.5008	3/8	1.50	.25	1.750	3
205P-103	1.5000–2.2499	.020	.125	8.50	6.50	Specify	2.2508	3/8	2.00	.50	2.625	4
205P-104	2.2500–3.2500	.020	.125	9.00	6.50	Specify	3.2508	3/8	2.50	.50	3.750	4

Note 1: Tube diameters have tolerance of +.0001", −.0000". Oversize allowance is provided so that bushing can be lapped to proper fit.
Note 2: For Special Models, if possible, use the value given here that corresponds to the gaging capacity desired.
Note 3: For Models 205P-1, 205P-2, 205P-3, and 205P-100, the flange is integral with the locating tube.
Note 4: Models 205P-103 and 205P-104 are furnished with three handles which may affect clearance conditions in deeply recessed holes.

HOLE LOCATION GAGE

EIGHT STOCK MODELS

SERIES 205

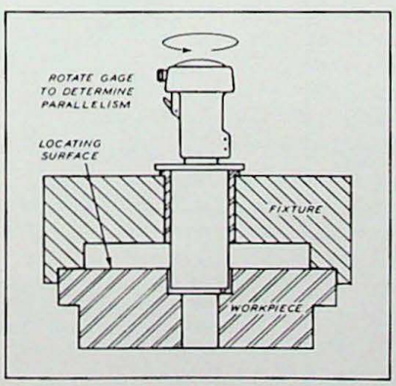
SINGLE DIMENSION, STOCK COMPONENT GAGES

Series 205 Gages are highly precise instruments designed primarily to provide an accurate means of checking hole location and concentricity, but are also adaptable to a variety of applications involving HOLE AND SURFACE RELATIONSHIPS. They are usually employed in conjunction with a master fixture which provides a predetermined reference.

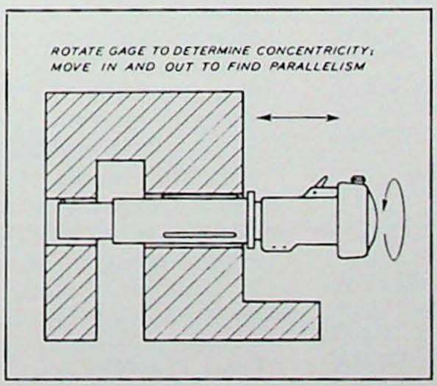
Eight stock models cover all dimensions from .125" to 3.250". These models meet the majority of hole location and concentricity gaging requirements, assuring low cost and fast delivery. All pertinent dimensions are given so that customers can design their own fixtures around the suitable Models or, if desired, may call on Federal to design and/or supply the fixture in addition to supplying the gage. Many special gages can be made from stock components and furnished at low prices.

Each gage is furnished to measure a single dimension within its capacity. All have a precision ground and lapped locating body or tube, to provide an extremely accurate fit in *standard* size precision bushings. Indicators are graduated in .0005", unless .0001" is specified. Centralizers for gaging hole concentricities without fixtures can be specially furnished. Sensitive contact may be positioned at the end of the gage for checking squareness of bore faces.

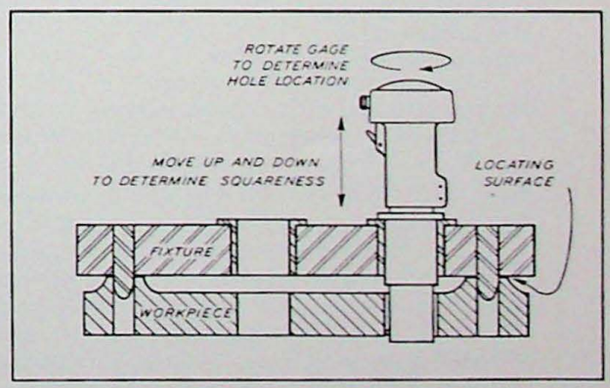
APPLICATIONS



PARALLELISM OF A BORE FACE TO A LOCATING SURFACE Contact is placed on end of gage to explore all segments of face as gage is rotated. Accurate stop on gage references on precision bushing.

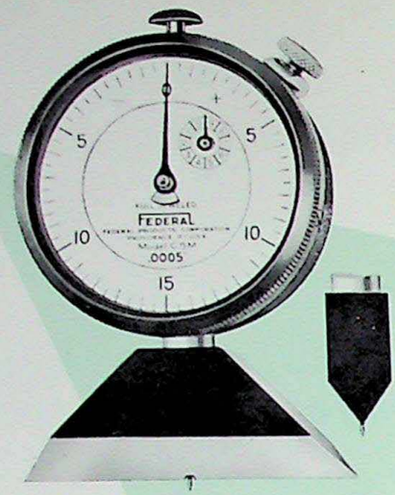


CONCENTRICITY AND PARALLELISM OF ONE HOLE WITH ANOTHER.



HOLE LOCATION WITH RESPECT TO A PREDETERMINED REFERENCE AND SQUARENESS OF HOLE AXIS TO A LOCATING SURFACE Dowels accurately locate fixture on part. Gage references in precision bushing.

SMALL INDICATING DEPTH GAGES



MODEL 65P-40
Push-Down Point
For small recesses, engravings, etc.

MODEL 75P-300

MODEL 75P-500

Vastly superior to old style "flush-pin" gages. These handy precision instruments give you accurate information at a glance . . . no need to guess or interpret. Convenient for inspection of slots, recesses, hole depths, keyways, etc.

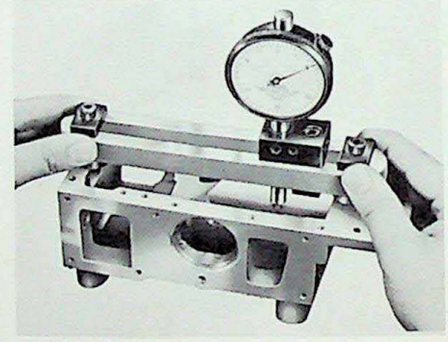
Other length points available from stock. Points of special length or shape can be furnished.

Model 75P-500 furnished with three points to provide 3" gaging capacity.

Regular Range
Self-Adjusting Point

Long Range
Self-Adjusting Point

Modification of Bench Type Depth Gage permits fast inspection of part that is hooked onto reference plate for simulated in-use check.



Miracle Movement Indicators on Depth Gages give long, dependable life, even under hard, continuous use. Interchangeable points of different lengths increase gage's versatility.

SPECIFICATIONS

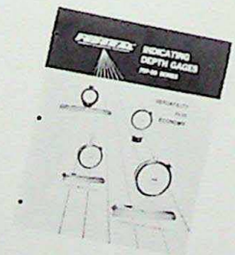
	BENCH MODEL	ADJUSTABLE MODELS		SMALL MODELS		
INDICATOR	75B-1	75P-10	75P-11	75P-300	75P-500‡	65P-40
Model	C8IS	C5M	C5M	C5M	C8IS	C5M
Minimum Graduation	.001"	.0005"	.0005"	.0005"	.001"	.0005"
Dial (Adjustable)	0–100*	0–15–0	0–15–0	0–15–0*	0–100*	0–15–0*
METRIC INDICATOR (graduated .010 mm.)	Q6IS	P6I	P6I	P6I	Q6IS	P6I
CONTACT POINT (Hardened Steel 3/16" diam. 3/16" Radius)	Two furnished 1/4" & 1 1/4" Long	1/4" Long	1/4" Long	1/8" Long†	3-furnished 1/8", 1 1/8" & 2 1/8" Long	Contact is V shaped Needle .050" Max. Dia.
RANGE OF SENSITIVE CONTACT	1.00"	.030"	.030"	.150"	1.00"	.075"
GAGE CAPACITY	0"-2.00"	0"-1.00"	0"-2.00"	0"-.150"	0"-3.00"	0"-.075"
REFERENCE SURFACE	3 1/4"x4"	Two 1" Dia. pads	Two 1" Dia. pads	2 1/2"x9/16"	2 1/2"x9/16"	2 1/2"
GAGE SIZE, OVERALL (Length, Width, Height)	5 3/8"x5 1/2"x 6 3/8"	7 1/4"x1 1/2"x 5 1/4"	7 1/4"x1 1/2"x 6 1/4"	2 1/2"x1"x 3 1/2"	2 1/2"x1"x 4 1/4"	2 1/2"x1"x 3 1/2"
WEIGHT (Approx.)	10 1/4 lbs.	1 1/4 lbs.	1 1/4 lbs.	8 oz.	8 oz.	7 oz.

Special bases and points can be furnished at slight additional cost.
See Indicator Catalog, page 24 for wide variety of available stock points.

*Has revolution counter

†Other points available from stock in multiples of 1/8" up to 3"

‡Regular price includes wooden case.



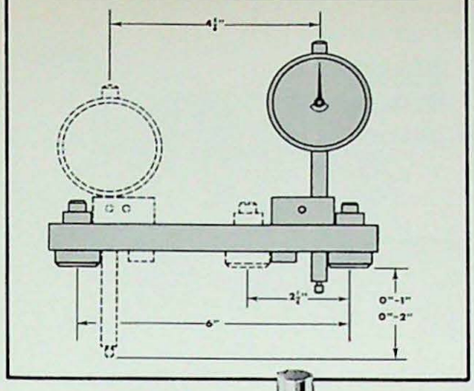
See enclosed brochure for versatile 75P-50 Series Indicating Depth Gages.

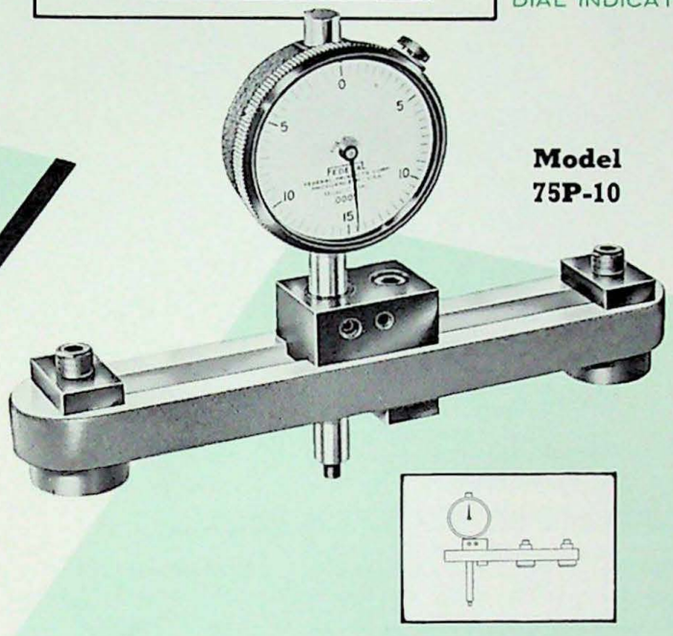
Good gages should have accurate Masters.
Specify Federal Masters.

Indicating DEPTH GAGES

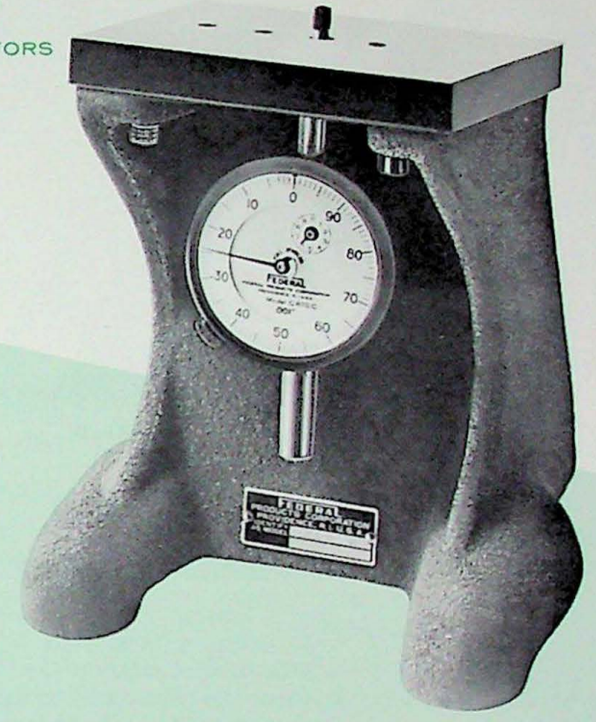
FULL JEWELED
MIRACLE MOVEMENT
DIAL INDICATORS

SERIES 75 and MODEL 65P-40





Model 75P-10



Model 75B-1

ADJUSTABLE DEPTH GAGES

Models 75P-10 and 11 are completely adjustable, universal type Depth Gages designed for production line or final inspection as well as general shop use. Model 75P-10 is designed to gage depths from 0" to 1"; Model 75P-11 from 0" to 2". Specially shaped contacts or longer points (up to 1") may be interchanged to extend the usefulness and depth capacity of either gage.

Large, one-inch diameter, hardened steel rest pads are ground flat and may be adjusted horizontally from 2¼" to 6" center to center. The Miracle Movement Indicator may be set at any position vertically within the capacity of the gage and can also be located at any point between the two pads. Or, it can be located outside the pads for use on overhang conditions. Lock screws maintain secure positioning for all adjustments. The Indicator, held to the mounting block by means of a split bushing, can be turned to face any direction. Contact point movement is accurately transferred to the Indicator by means of an auxiliary plunger which also protects the Indicator spindle from wear caused by eccentric loads. The plunger itself is keyed to prevent rotation, thus assuring greater accuracy.

Vastly superior to adjustable flush pin gages, these versatile instruments pay for themselves many times over in accuracy, ease of measurement and all around usefulness.

BENCH TYPE INDICATING DEPTH GAGE

Model 75B-1 is a compact, highly versatile Depth Gage for use at the bench or at the machine for quick, positive inspection of slots, recesses, hole depths, etc. It eliminates human influences which can occur when Depth Gages are applied manually to the workpiece. Its large work surface permits both large and small parts to be located quickly and positively. The solid cast iron frame provides rigid support for the Miracle Movement, Long Range Indicator which is adjustable 1¼" vertically. The extra size (3¼" x 4") work table is hardened and ground, making an excellent reference surface, and is mounted on the casting with a 15° backward slope so that it will be easy to determine when work is located flush with the surface. Four #10-32 tapped holes are provided in the table for mounting auxiliary fixtures.

Two contact points, ¼" and 1¼" long are furnished with each gage, and together with indicator adjustment provide an overall gaging capacity of 2". Specially shaped or longer contact points can be furnished as extras.

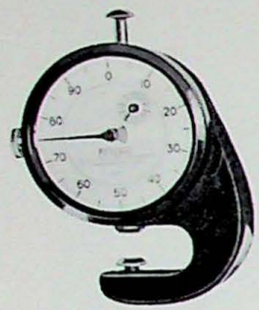
This Long Range Depth Gage responds at a touch; nothing to turn or manipulate. Place the work in position and read the dimension or variation accurately . . . without hesitation . . . without guessing.

THICKNESS GAGES

Portable

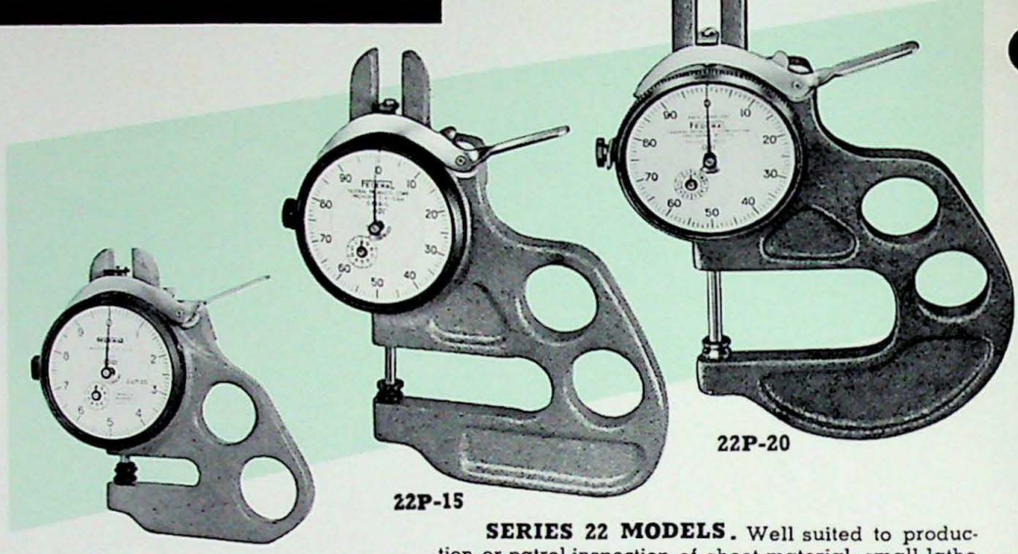
FULL JEWELED MIRACLE MOVEMENT DIAL INDICATORS

SERIES 22 MODELS 26P-7 & 644



MODEL 26P-7

Shaped for natural, convenient grip between thumb and second finger. Forefinger is free to control normally open sensitive contact. Pressure on button engages workpiece between contacts. Use for gaging other than compressible materials.



22P-10 22P-15 22P-20

SERIES 22 MODELS. Well suited to production or patrol inspection of sheet material, small lathe or screw machine parts, and compressible materials. Contacts are retracted by finger-operated lifting lever. Gaging pressure is independent of operator influence. Models offer choice of gaging capacity, throat depth, and sensitivity.

ACCURATE, MULTI-PURPOSE COMPARATORS

These handy, pocket-size gages have been consistently popular because of their compactness and light weight as well as the unusual accuracy with which they measure sheet material and various types of small parts. Many special uses have been found for them since contact size and shape can be easily modified to suit individual requirements. Because of their ease of handling they are often used as snap gages, in which case Balanced Dials are provided.

Not only are these gages used as personal instruments but are employed extensively for production work because of their rugged, unified construction — the frame of the gage is the case of the Indicator. This provides the rigidity and compactness essential to dependable accuracy. All contacts are hardened, ground and lapped flat. All Indicators have full Jeweled Movement and adjustable Dials with Revolution Counters.

MODEL 644

HEAVY DUTY SHEET STOCK GAGE

Model 644 has many uses in connection with rapid checking of hot or cold sheet and strip stock. Hand grip retraction permits quick entry of the stock. Release of the grip allows the gage to automatically position itself perpendicular to the material so that accurate measurement can be seen at a glance, without hesitation or maneuvering. Use it in the receiving room to confirm size of stock delivered; in the stock room to check thickness of material drawn for manufacturing; or on the production line to determine stock thickness before and after plating. The 644 is a rugged gage with many uses.

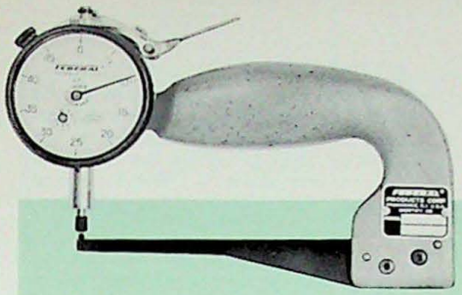
SPECIFICATIONS

Model 644		Model 22P-10	Model 22P-15	Model 22P-20	Model 26P-7
	INDICATOR				
G8I	English Model	C2I	C8IQ	C8IS	C8I
.001"	Minimum Graduation	.0001"	.001"	.001"	.001"
0–100	Dial (Continuous)	0–10	0–100	0–100	0–100
Special	Metric Model	P1I	Special	Special	P6I
	Minimum Grad. (mm.)	.002			.010
	Dial (Continuous)	0–20			0–100
	(Dials are adjustable and include Revolution Counter. Balanced dials are optional at no additional cost).				
	CONTACTS (Sensitive & Reference)				
Hardened Steel	Material	Hardened Steel			
.035"†	Dimensions	¼"	¼"	¼"	¼"
.200"	RANGE OF SENSITIVE CONTACT	.100"	.500"	1.000"	.300"
0-.200"	GAGE CAPACITY	0-.100"	0-.500"	0-1.000"	0-.300"
3"	MAXIMUM THROAT DEPTH	1⅛"	2"	2"	⅝"
2 lbs.	WEIGHT (Approx.)	7 oz.	10 oz.	10 oz.	8 oz.

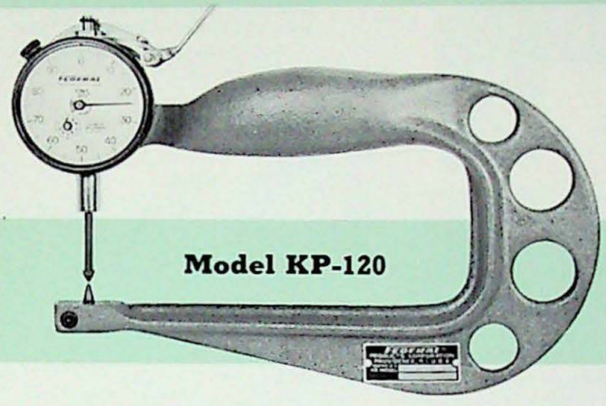
†Seating contacts are ⅝" Dia.
English Model Indicator will be furnished unless otherwise specified.

THICKNESS GAGES
(Portable and Bench)

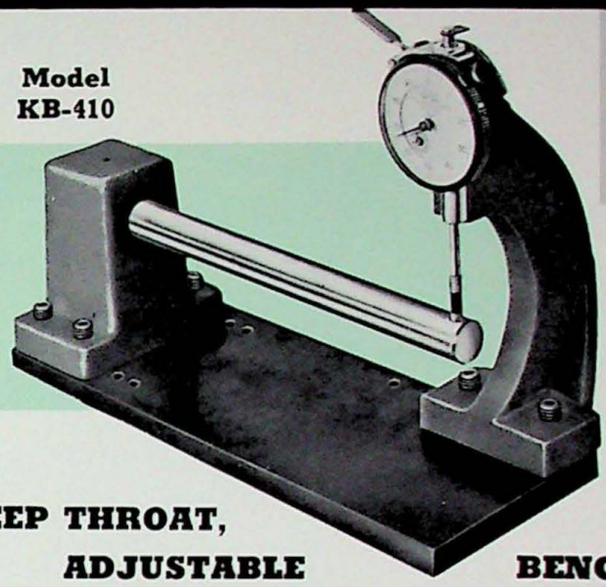
SERIES K



Model KP-102



Model KP-120



Model KB-410

DEEP THROAT PORTABLE GAGES

Series K Portable Thickness Gages are available from stock in a variety of Models designed for thickness measurement of tubing, castings and flat stock of all kinds. Their long range and deep throat capabilities make them unusually versatile in gaging a wide range of thicknesses and permit them to clear flanges, bosses, and other obstructions.

Frames are of ribbed construction to combine lightness with strength and rigidity. The hand grip is properly located for optimum balance and gaging ease. The sensitive anvil is retracted by means of a lifting lever which is designed so that it cannot influence contact pressure. Contacts are normally cone shaped and radiused at the point. However, other type contacts can be supplied and the gages themselves can be modified and supplied in a wide range of frame sizes to suit special requirements.

DEEP THROAT, ADJUSTABLE BENCH GAGE

Model KB-410 is a long range, universal, bench model Thickness Gage which has many uses in either the large plant or small shop. While normally used for thickness measurements of tubing, sheet material, etc., it may also be used as an easy-to-operate bench comparator by simply removing the mandrel. A wide choice of Federal Indicators having regular backs can be quickly interchanged without modification of the gage. An extensive variety of work can be gaged while keeping the mandrel at minimum length to help provide maximum accuracy.

Gaging depth is readily adjustable by repositioning the Indicator support post in the holes provided at one inch intervals. A cam type lifting lever retracts the radiused contact of the long range Indicator without influencing gaging pressure. The user can substitute mandrels of his own design, if desired, to suit special requirements, or alter the height of the Indicator for gaging unusual thicknesses. The cast iron base provides rigid support for the gage components, assuring dependable measurement accuracy. Special components can be economically supplied to meet individual requirements.

SPECIFICATIONS

INDICATOR	Model KP-102†	Long Range Models	Bench Model
Model	C7I	C8IS	C8IS
Minimum Graduation	.0005"	.001"	.001"
Dial (Continuous, Adjustable)	0–50*	0–100*	0–100*
Metric Model — (Optional)	Q3I	Q6IS	Q6IS
CONTACTS (Hardened Steel) Reference and Sensitive	Radiused	Cone Shaped	Radiused
RANGE OF SENSITIVE CONTACT	.125"	1.00"	1.00"
GAGING CAPACITY	0-.125"	0-1.00"	0-1.00"
MAXIMUM THROAT DEPTH	← (See table) →		
MANDREL DIAMETER (other sizes available See Price List)	.750"		
CONTACT HEIGHT ABOVE MANDREL	.031"		
WEIGHT (Approx.)	1½ lbs.	1¾-2½ lbs.	16½ lbs.

*Dials have revolution counter

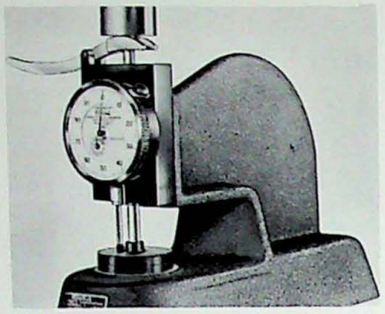
†Lower arm will clear a .340" I.D. for length of 2.25"

All Models may be modified to suit special needs. Please send blueprint and, if possible, sample of work to be gaged.

	Throat Depth	Depth is adjustable from:
Portable Models		
KP-102	4"	—
Long Range		
KP-120	6"	—
KP-119	8"	—
KP-125	10"	—
KP-129	12"	—
Bench Model (Long Range)		
KB-410	8"	4" to 8"

Federal Gages have already been designed to the following A.S.T.M. Specifications:

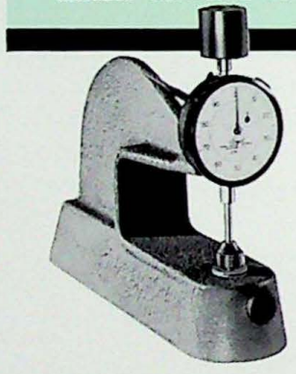
FOR	A.S.T.M. SPEC.	GAGE MODEL NO.
General Testing of:		
Textile	D-76-53	691B per Y-6972
Knit	D-231-62	
Asbestos Tape	D-315-62T	
Woven Asbestos Cloth	D-1571-58T	
Woven Tapes	D-259-44	
Tire Fabrics (except Cord)	D-122-62T	
Holland Cloth	D-376-35	
Rubber Coated Fabrics	D-751-60T	
Testing of:		
Wool Felt	D-461-61	691B-28 per Y-6458
Mechanical Sheet Felt	D-1114-51	
Mechanical Roll Felt	D-944-50	
Thickness of:		
Solid Electrical Insulation	D-374-57T	691B-1 per Y-5777
Woven Glass Tapes	D-580-49	
Woven Glass Fabrics	D-579-49	
Compression Set of:		
Vulcanized Rubber	D-395-61	691B-28 per Y-6894
Tension Testing of:		
Vulcanized Rubber	D-412-62T	691B-1 per Y-6559
General Testing of:		
Sponge Rubber	D-1056-62T	57B per Y-7692
Expanded Cellular Rubber	D-1056-62T	
Latex Foam Rubber	D-1055-62	
Thickness of:		
Paper	D-645-58T T-411M (T.A.P.P.I.)	691B-1 per Y-6656

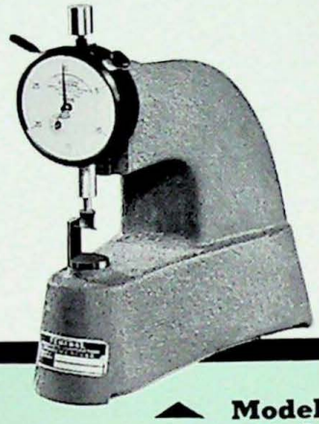


SPECIAL MODELS with auxiliary plungers can be furnished when the auxiliary weight must be in excess of 2 lbs. The weight rests on the plunger, thus relieving the Indicator mechanism of strain. The Indicator contact then follows plunger motion.

Model 691B-28

Long Range Model 691B-28 provides greatly increased vertical capacity (1") without sacrificing throat depth. Continuous Dial is adjustable and includes Revolution Counter.





Model 57B-3

Model 57B-3 designed especially for inspecting wall thickness of rubber insulation and tubular material. Has rod and chisel contacts; dead load gaging pressure is 25 grams (detachable weight alone — 10 grams).

WHEN ORDERING:

1. Please specify Model Number.
2. Balanced Dials and/or Metric Indicators are optional at no additional cost.
3. If special contacts, weights, etc. are required, please cite the applicable A.S.T.M., T.A.P.P.I. or other Testing Standard.
4. If there is no industry standard for your product, please send sample of work and specify contact shape and dimensions, measuring tolerance, and dead load weight of sensitive contact (presser foot).

SPECIFICATIONS

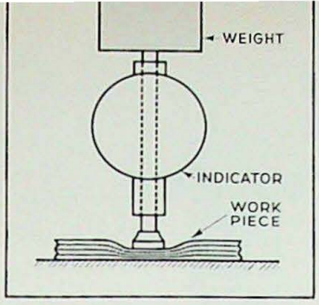
	Model 57B-1	Model 57B-2	Model 57B-3	Model 691B	Model 691B-28
INDICATOR					
Model (with lifting lever)	D8I-S	D7I	C5M	D2I	D8I-S
Minimum Graduation	.001"	.0005"	.0005"	.0001"	.001"
*Dial, (Continuous with revolution counter) (Metric Indicators Available)	0–100	0–50	0–30	0–10	0–100
CONTACT (Sensitive)					
Material	Hardened Steel			Hardened Steel	
Dimensions	3/16" Dia. & Contact Radius	3/16" Dia. & Contact Radius	Chisel Edge (.043")	.407 Dia.	.407 Dia.
RANGE OF SENSITIVE CONTACT	1.00"	.500"	.300"	.100"	1.00"
GAGE CAPACITY	1"	1"	.300"	.200"	1"
REFERENCE SURFACE	Platen 2 1/8" Dia.	Platen 2 1/8" Dia.	Pin .043"	Anvil .407 Dia.	Anvil .407 Dia.
THROAT DEPTH	2 7/16"	2 7/16"	2 7/16"	4"	4"
GAGING PRESSURE (with auxiliary weight)	—	—	25 gr.	10 oz.	10 oz.
BASE DIMENSIONS (Approx.)	4"x6 1/4"	4"x6 1/4"	4"x6 1/4"	2 3/4"x10"	2 3/4"x10"
HEIGHT, OVERALL (Approx.)	7 1/4"	6 1/2"	6 1/2"	8"	9"
WEIGHT (Approx.)	7 lbs.	7 lbs.	7 lbs.	14 1/2 lbs.	15 1/2 lbs.

*Balanced Dial Optional

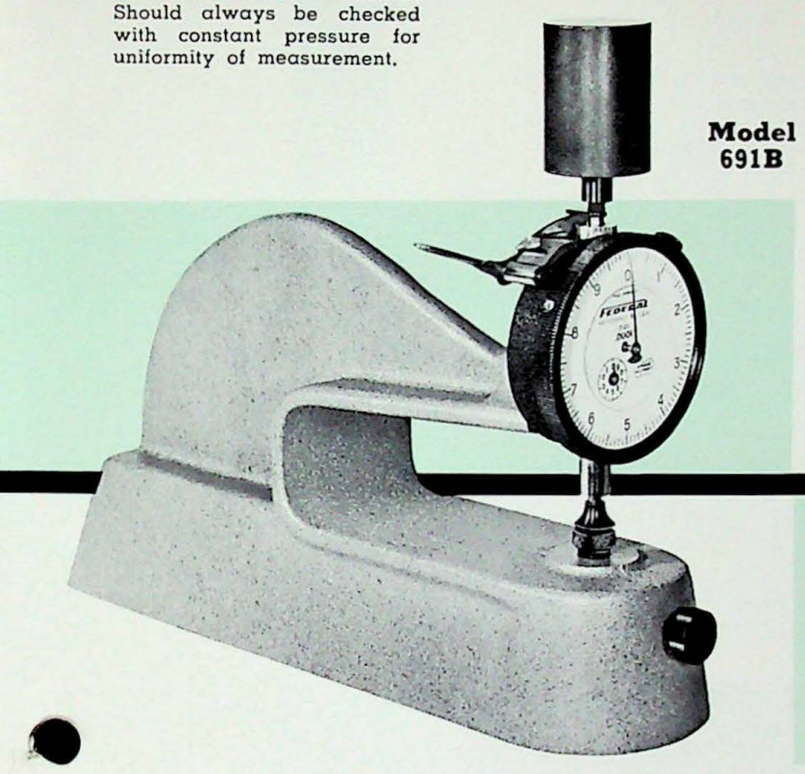
THICKNESS GAGES
(Bench)

SERIES 57 and 691

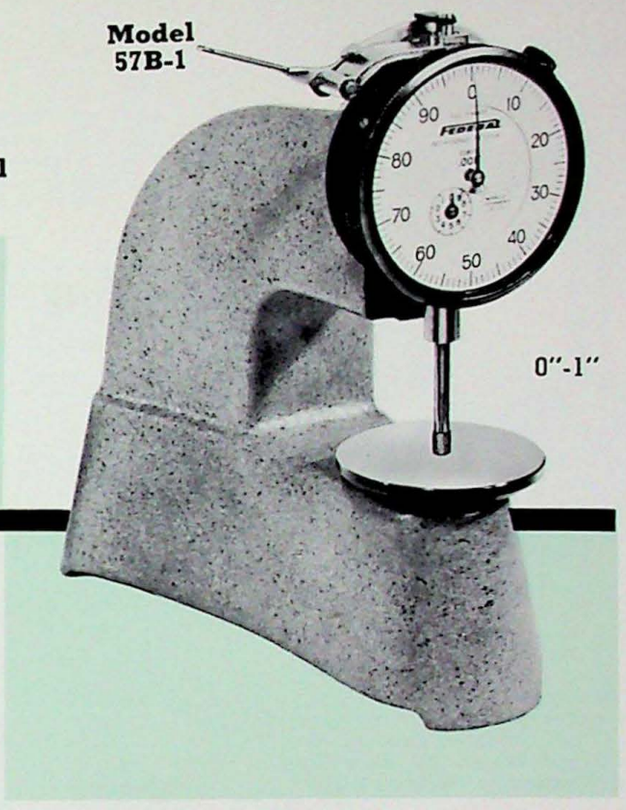
FULL JEWELED
MIRACLE MOVEMENT
DIAL INDICATORS



COMPRESSIBLE MATERIAL
Should always be checked with constant pressure for uniformity of measurement.



Model 691B



Model 57B-1

0"-1"

DEEP THROAT BENCH THICKNESS GAGE

Series 691 Gages are designed primarily for the measurement or comparison of compressible materials such as plastics, felt, leather, rubber, paper, cloth, synthetic fabrics etc. or for any application requiring constant contact pressure. Use of the weight applied directly through the Indicator spindle assures constant, uniform pressure throughout the measuring range.

The deep throat allows ample clearance for most work. Heavy ribbed construction of the arm provides ample strength for steady support of the Indicator. Both contact and reference anvil are lapped flat and parallel. The anvil is adjustable in height over a limited range by means of small screw under the base and is locked securely in position by the knurled thumb screw at the front of the gage.

Lifting lever, (normally furnished for operation with left hand) is used only to retract sensitive anvil and does not influence contact pressure. Various size weights and anvils of special design can be furnished in accordance with specifications set up by A.S.T.M. and other industry standards for measurement of various materials. Prices on request.

SMALL BENCH THICKNESS GAGE AND COMPARATOR

Series 57 Gages find widespread use for checking thickness of flat stock such as paper, cardboard, fabric, rubber textiles and sheet metal and are also popular for measurement of miscellaneous small parts. They are lightweight and may be easily modified at only slight added cost to include special contacts, anvils and weights required to meet specific measurement standards for a wide variety of materials. Since these gages are designed to accommodate *any* C or D size Federal Indicator with an adjustable bracket back, they may be quickly altered to suit new gaging requirements.

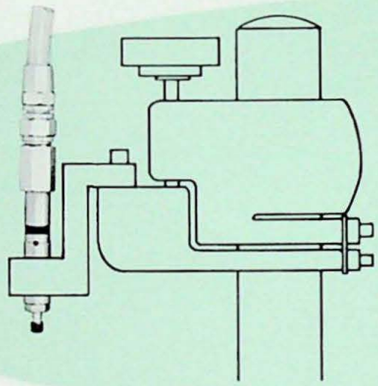
Gaging height is set by locking the Indicator at the desired distance from the large, accurately ground work platen. Fine adjustment is then made by setting the adjustable dial. Solid casting bed and webbed frame provide the strength and rigidity necessary for accurate measurement. A boss and tapped hole (¼"-20) is provided on the underside of the frame so that the gage may be anchored to bench, if desired. Each gage is equipped with lifting lever (to the left as you face the gage, unless otherwise specified) so that work can be quickly inserted between contacts.

VERSATILITY . . . SENSITIVITY . . . ACCURACY . . .

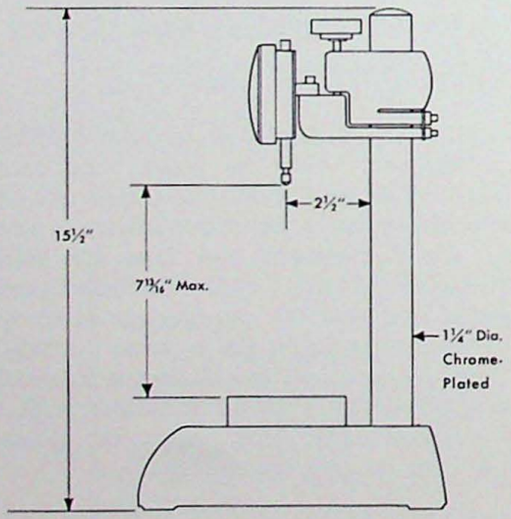
CHOICE OF ANVILS:

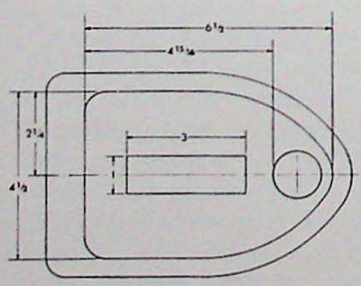
A choice of anvils is available: plain surface or serrated surface. Both are 1" x 1" x 3" hardened steel and are ground and lapped flat to within .000010" over the entire surface.

AirProbe
GAGE HEAD



The Fine Adjustment Arm will accommodate other Federal high magnification gaging systems like the AirProbe shown above. A variety of magnification ranges is available for all systems: air, electric, or electronic.





UNLESS OTHERWISE SPECIFIED:
Super-Sensitive Indicator Model C1/2K will be furnished.

PLEASE SPECIFY:
Type of Anvil desired — plain or serrated.

OPTIONAL:
Fine Adjustment Arm (AM-110) is available from stock for use on any comparator having a 1¼" column.

SPECIFICATIONS

INDICATOR NORMALLY FURNISHED

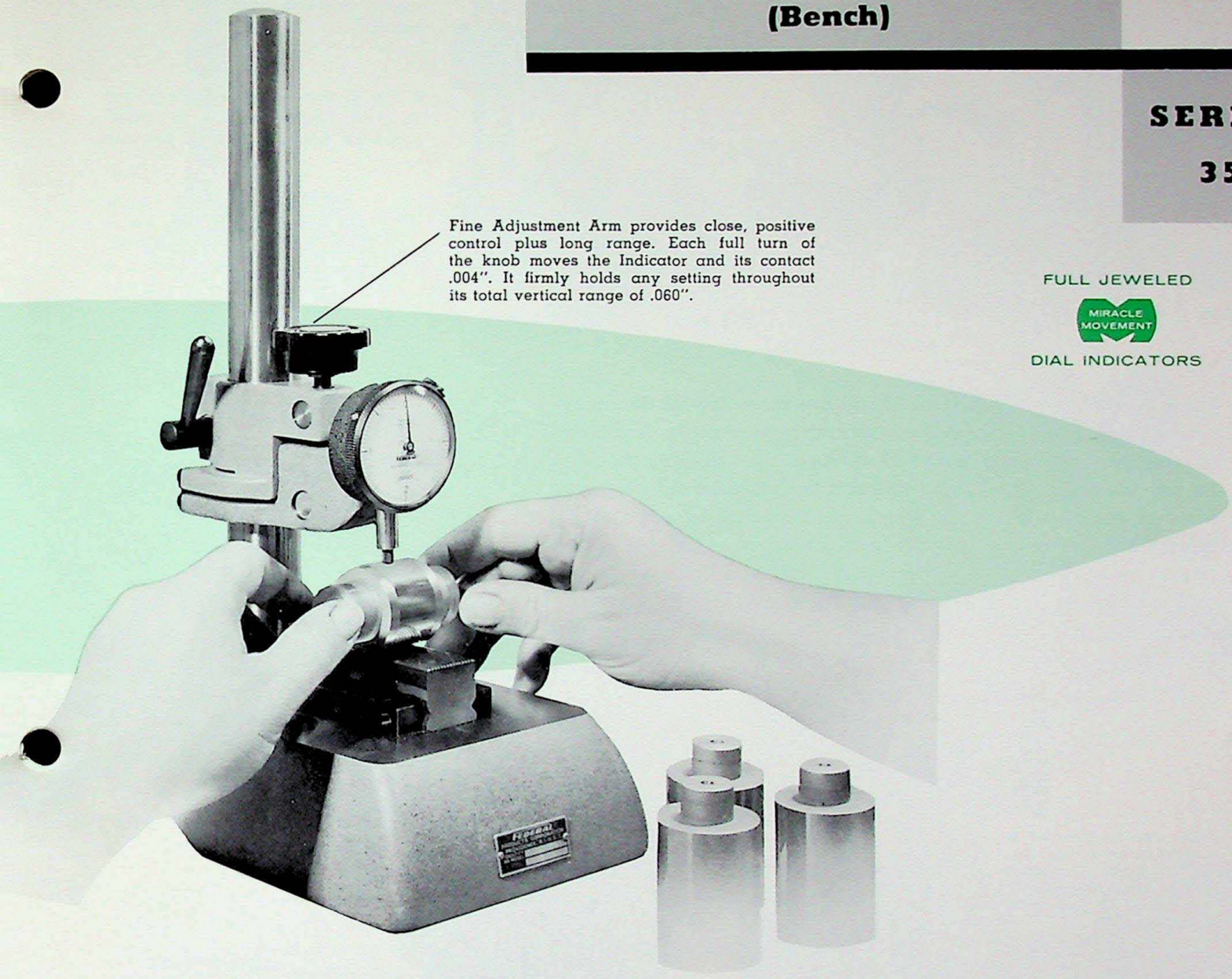
Model	C½K
Minimum Graduation	.000050"
Range of Sensitive Contact	.010"
Dial (Balanced & Adjustable)	0–2–0
Contact (Spherical Radius)	3/16"
GAGE CAPACITY	0" to 7 13/16"
THROAT DEPTH	2½"
ANVIL (Serrated or Plain)	1" x 1" x 3"

Use FEDERAL Masters. See page 45

COMPARATORS

(Bench)

SERIES 35



Fine Adjustment Arm provides close, positive control plus long range. Each full turn of the knob moves the Indicator and its contact .004". It firmly holds any setting throughout its total vertical range of .060".

FULL JEWELED
MIRACLE MOVEMENT
DIAL INDICATORS

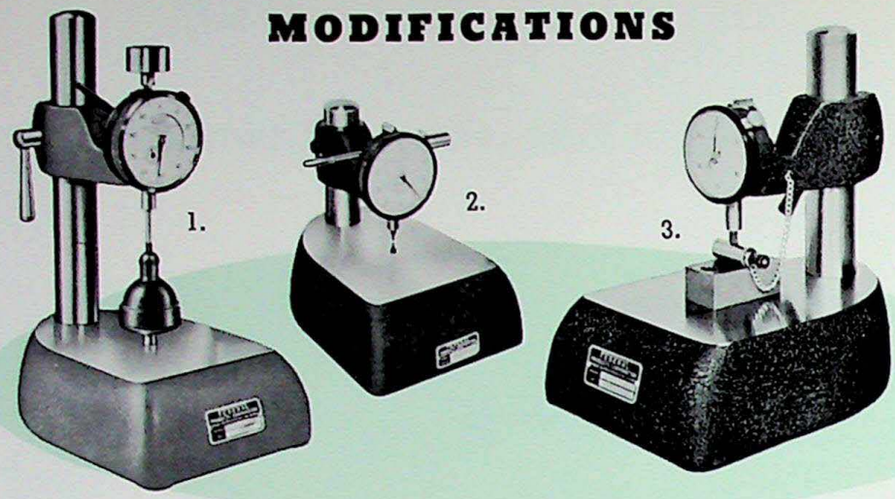
HIGH MAGNIFICATION COMPARATOR FOR CLOSE TOLERANCES

This new High Precision Comparator offers laboratory instrument quality in a rugged, compact and inexpensive gage especially suited for production use. Designed to check close tolerances with Federal's high magnification, Super-Sensitive Dial Indicators, Model 35B-248 features rapid set-up, high sensitivity, fast operation and long-life reliability for workpiece inspection right out at the machine.

The Fine Adjustment Arm (AM-110) assures smooth, even control throughout its entire vertical range of .060". Each revolution of the knob moves the gage head and its contact .004". A steel-spring hinge at the back of the arm eliminates pivot shift and an internal coil spring prevents backlash when the direction of adjustment is reversed. The locking lever firmly clamps the arm in position after coarse adjustment has been made. Easily removed, the Fine Adjustment Arm can be used on any other comparator having a 1¼" column.

Model 35B-248 has a vertical gaging capacity of 0" to 7-13/16" and a throat depth of 2½". Both plain surface and serrated anvils are available and are easily interchanged. While normally furnished with a Super-Sensitive Dial Indicator, Model C1/2K, this versatile comparator will also accommodate most AGD style Indicators and other high magnification gage heads having spherically radiused contacts: air, electric, or electronic.

MODIFICATIONS



1. For measuring wall thickness of rubber nipples. Gage is provided with special reference anvil and weighted spindle.

2. For thickness measurement of fragile parts. Upper anvil is counterbalanced for minimum gaging pressure.

3. Equipped with special reference anvil for measurement of part having shoulders spaced width of anvil. Shown with Master.

These modifications of Model 35B-30 are but a few of the many which have been made to suit special requirements. Auxiliary fixtures may be easily attached to base. Special contacts may be provided. Weighted Indicators can be furnished for measurement of compressible parts which are too large for capacity of other thickness gages, or gage may be altered to measure distance between reference points on tapers, grooves, bevels, etc. Please send sample part or print for design and prices.

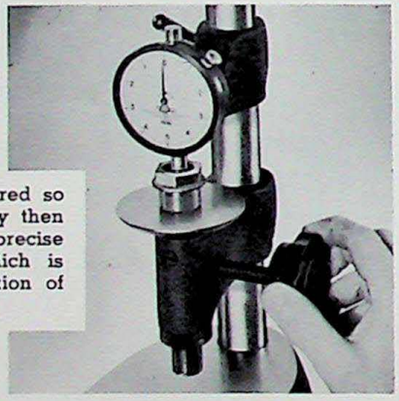


Table can be lowered so contact enters cavity then raised quickly to precise gaging position which is determined by position of adjustable lock nut.

ADJUSTABLE TABLE ATTACHMENT

SPECIFICATIONS

	35B-30	35B-8
INDICATOR		
Model	D5M	C8I*
Minimum Graduation	.0005	.001
Dial (Adjustable)	0–15–0	0–100
CONTACT		
Material	Hardened Steel	
Dimensions	3/16" Radius	3/16" Radius
RANGE OF SENSITIVE CONTACT	.075	.250
GAGE CAPACITY	0"-8 3/4"	0"-2"
REFERENCE SURFACE	4 1/2"x4 7/8"†	2" Dia.
THROAT DEPTH	2 1/2"	1 1/2"
TABLE ATTACHMENT ADJUSTMENT	1"	3/16"
COLUMN DIAMETER	1 1/4"	7/8"
BASE DIMENSIONS, OVERALL	8"x5 1/2"	6" Dia.
HEIGHT, OVERALL	14 1/2"	9"
WEIGHT (Approx.)	18 1/4 lbs.	6 lbs.
EQUIVALENT METRIC INDICATOR	Q6I	P6I

*Equipped with Lifting Lever
†Table (optional) is 3" Dia.

Provided as extra equipment for Model 35B-30, it greatly increases utility, providing a wide range of adjustability for thickness measurement. Vertical fine adjustment is made conveniently over a 1" range by rotating the large knob. Adjustable stop beneath bracket locates the 3" diameter table at the proper measuring point, making it possible to reach many dimensions, especially in cavities, that could not be gaged conveniently otherwise. Table has ground surface; may be easily swung aside when not required. Gaging capacity, when table is used, is 0" to 4 1/2".

Use FEDERAL Masters. See page 45

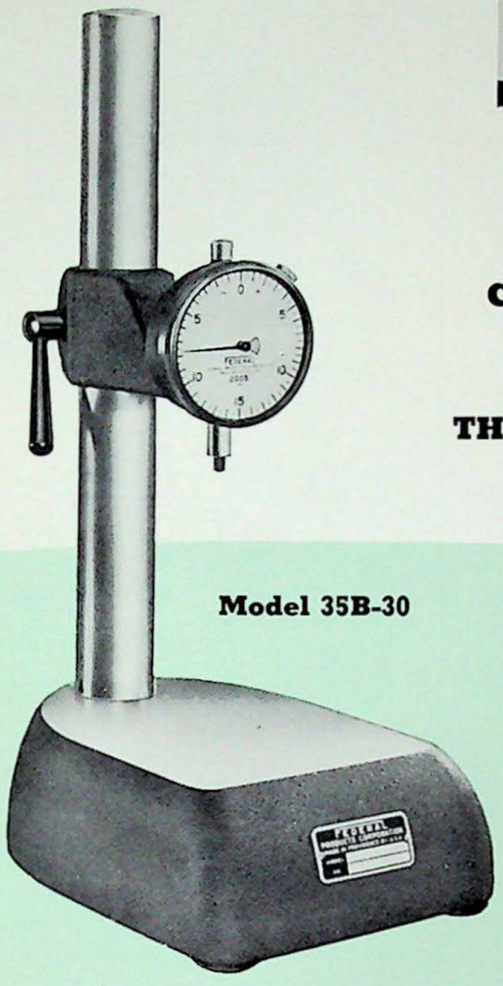
COMPARATORS

(Bench)

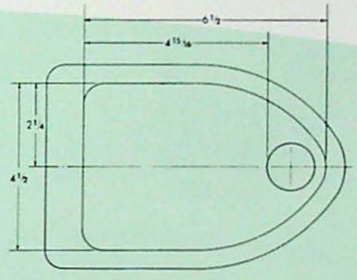
SERIES 35

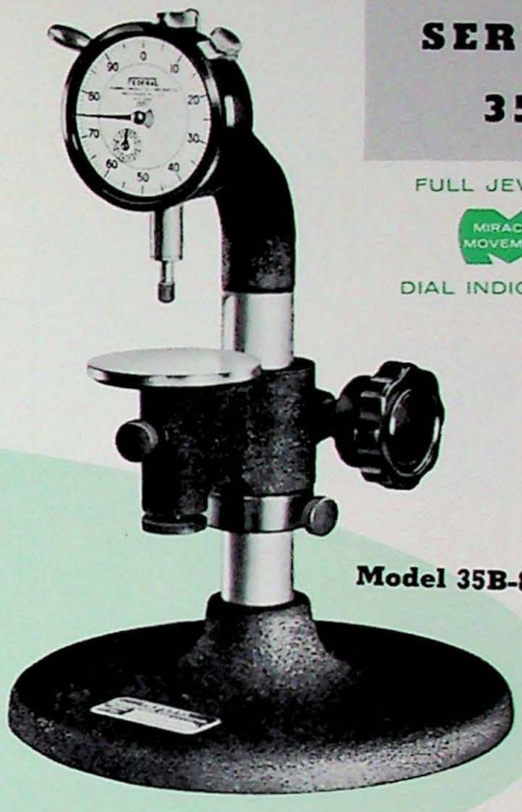
FULL JEWELED MIRACLE MOVEMENT DIAL INDICATORS

COMPARATORS OR THICKNESS GAGES



Model 35B-30





Model 35B-8

Series 35 Gages are rigidly built, compact and versatile instruments designed primarily for thickness measurement, but also adaptable for inspection of other outside dimensions on a variety of parts.

Model 35B-30, because of its convenient size and solid construction, has proven very popular as a general purpose comparator. It has also found widespread use as a single purpose instrument since it lends itself so well to modification.

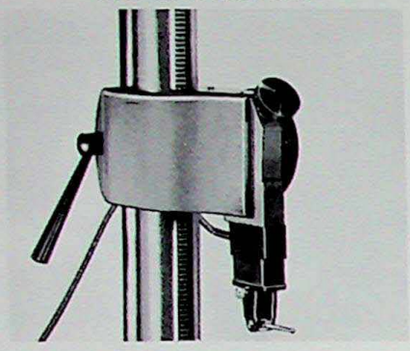
Model 35B-8, while incorporating less vertical capacity and a smaller reference surface, has the advantage of longer range permitting direct thickness measurement on a greater variety of parts without resetting. The lifting lever permits quick, easy inspection of parts having cavities up to ¼" deep. When the gage is used for comparative measurement, an Indicator having a Balanced Dial can be furnished.

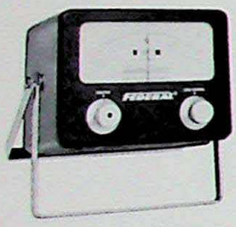
The reference table, equipped with a fine adjustment screw, is securely positioned by means of the large clamping knob. A collar permits the table to be swung from side to side without altering vertical position.

A table attachment having greater range of adjustment is available as extra equipment for Model 35B-30 (see description). Thus, this gage with its medium throat depth, substantial base and column, and rigid Indicator support is not only dependable for heavy duty production inspection, but with use of the table, becomes a highly reliable instrument for general shop use as well.

Model 35B-8 Comparator provides quick dependable thickness measurement of parts up to 2". Lifting lever retracts contact over full indicator range of .250". Table height and position are adjustable.

ELECTRONIC





THE ELECTRO-CHECK

- High Magnification
- Lowest Gaging Pressure

The Electro-Check gaging pressure of less than 2.5 grams, plus high magnification, make possible the ultra-precise inspection of even the most delicate workpieces. The compact amplifier uses transistors and a printed circuit for long term dependability and accuracy. While the Electro-Check is normally furnished with long-life mercury cells (1200 hours), a battery eliminator is available for permanent installations.

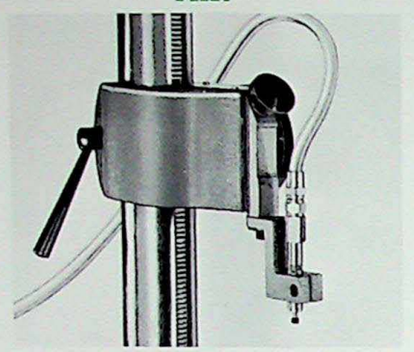
— SPECIFICATIONS —

ELECTRO-CHECKS
(Gage Head #EHE-1010)

Model	Ranges	Min. Grad.	Magnif.
230P-120	±.010"	.0005"	220
	±.002"	.0001"	1100
	±.0004"	.00002"	5500
230P-121	±.004"	.0002"	550
	±.001"	.00005"	2200
	±.0002"	.00001"	11000
230P-123	±.002"	.0001"	1100
	±.0004"	.00002"	5500
	±.0001"	.000005"	22000

Throat Depth w/Electro-Check: 3-11/16".
Vertical Capacity: 7" with anvil.
8 3/8" with platen.

AIR



THE AIRPROBE

- High Sensitivity
- Actual Calibrated Readings

The high magnification and sensitivity of air gaging can be combined with this highly accurate comparator by substituting an AirProbe for the Dial Indicator and including a Dimensionair for definite, precise size indication. No special setting masters are needed for the AirProbe and the Dimensionair can be zeroed to a single master, just like a Dial Indicator. The large, easy-to-read dial and dependable accuracy of the Dimensionair plus the variety of AirProbe ranges makes air gaging available to most of your tolerance requirements.

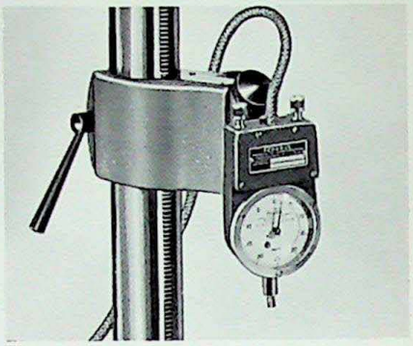
— SPECIFICATIONS —

AIRPROBES

Model	Range	Grads.	Dial*
AA1-3	.003"	.00005"	ADL-28
AA1-6	.006"	.0001"	ADL-16
AA1-15	.015"	.0002"	ADL-20
AA1-30	.030"	.0005"	ADL-24

*Dimensionair must be equipped with dial to suit range. AirProbes and dials color-coded.
Throat Depth with AirProbe: 4-9/16".
Vertical Capacity: 7½" with anvil, 9-5/16" with platen.

ELECTRIC



THE ELECTRICATOR

- Economical
- High Speed
- Calibrated

For high speed bench gaging, the Federal Electricator, Series 134, can be mounted on the regular adjustment arm. This is a Miracle Movement Dial Indicator combined with a two-limit, spindle actuated switch. Used with a Light Indicating Unit (131B-3) it provides tolerance light classification of work into Over, Good, and Under categories while the Indicator shows actual work size.

— SPECIFICATIONS —

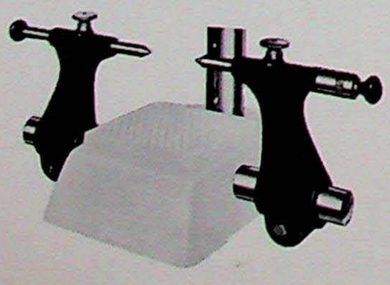
ELECTRICATORS

Model	Indicator	Grads.	Range
134B-2	C2I	.0001"	.050"
134B-3	C3K	.00025"	.050"
134B-5	C5M	.0005"	.100"
134B-6	C6K	.0005"	.100"
134B-7	C7I	.0005"	.100"
134B-8	C8I	.001"	.100"

Switch Limit Adjustment (From zero)
Models 134B-2, 3 — Hi — .010" to + .035"
Low — .015" to + .010"
Other Models — Hi — .010" to + .020"
Low — .025" to + .010"
Contacts (switching) — Palladium
Throat Depth with Electricator: 4-3/16".
Vertical Capacity: 8-1/16" with anvil, 9-7/16" with platen.

ACCESSORIES

CENTER ATTACHMENT MODEL A-100B-20-3

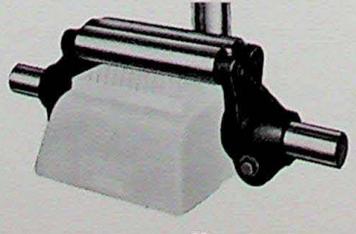


Can be quickly attached. Adjustable for length. Spring pressure on centers holds part. Pull right hand knob to release part.

Maximum distance between centers ..... 8½"
Mounting Bar 18" long x 1½" diameter
Maximum Vertical Capacity (Sensitive Contact to center) ..... 5⅞"
Maximum swing of attachment ..... 3½"

ADJUSTABLE BACKSTOP for diameters up to 3" available.

ROLLER V BLOCK MODEL A-100B-20-4



Easily attached through hole in base of gage. Rollers are fixed but can be rotated when necessary to compensate for wear.

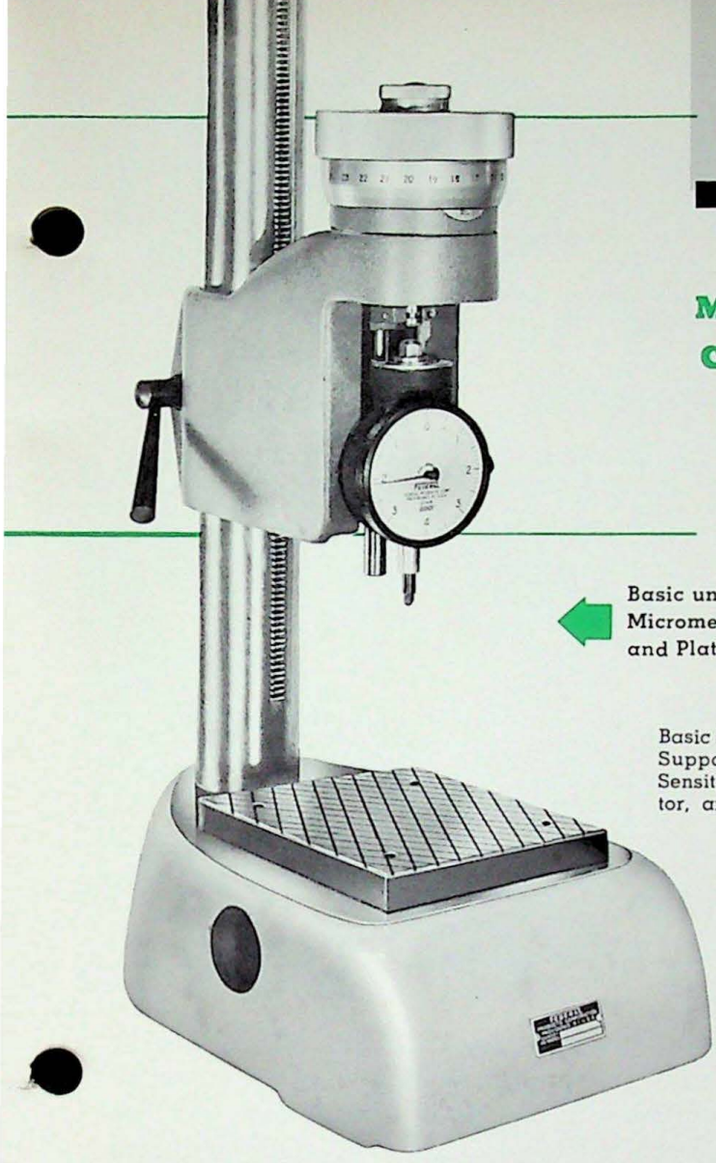
Maximum length of roller V blocks....7½"

Maximum Vertical Capacity (Sensitive Contact to top of rolls) .....7¼"

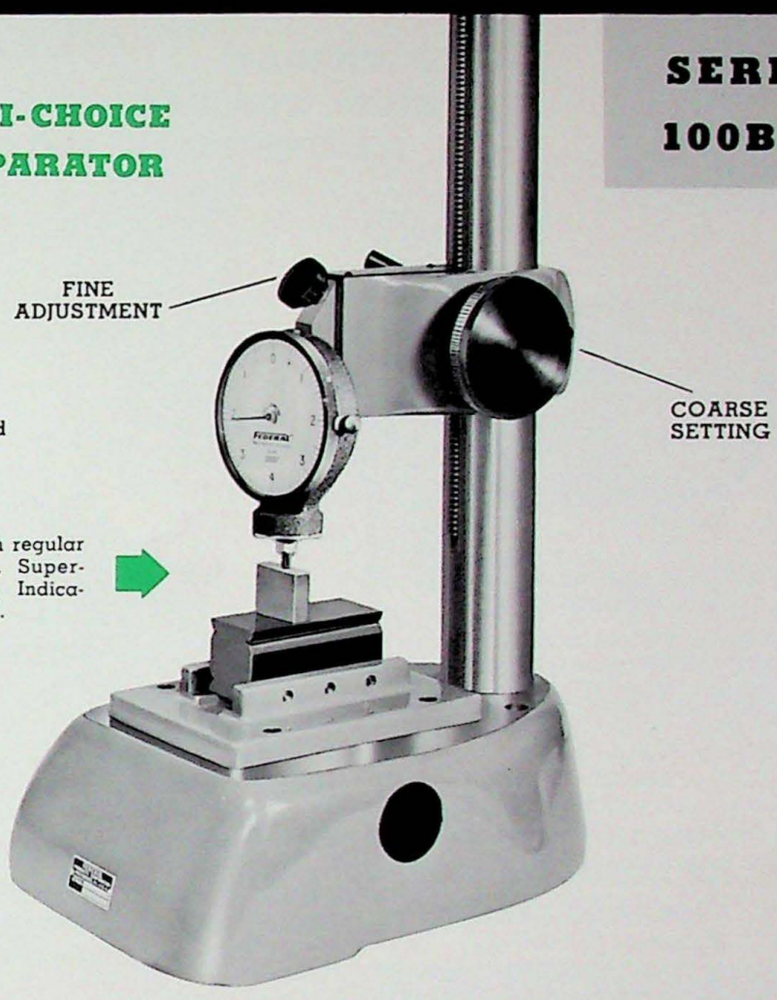
COMPARATOR

SERIES 100B-40

MULTI-CHOICE COMPARATOR



Basic unit with Micrometer Head and Platen



Basic Unit with regular Support Arm, Super-Sensitive Dial Indicator, and Anvil.

ONE BASE AND COLUMN TAKES MANY GAGING ARRANGEMENTS . . . DIAL INDICATOR, AIR, ELECTRIC OR ELECTRONIC

Series 100B-40 Comparator provides a sturdy base and precision column as a basic unit. The user then selects the Gage Head, holding arm, and reference surface best suited to his needs. If requirements change, it is a simple matter to substitute or add additional equipment. Shown above are two of the most common combinations, with alternate gaging methods illustrated on the left hand page.

BASIC UNIT SPECIFICATIONS

BASE (W-L) — 7-9/16" x 11-11/16". HEIGHT (Overall) — 21-1/4".
COLUMN DIAMETER — 2".
REFERENCE SURFACES — Platen (PL-99) 6" x 4½" x ¾".
Anvil (AL-517) 3 3/16" x 1½".

MICROMETER HEAD SPECIFICATIONS

MICROMETER — Range 1", Minimum Graduation .0001".
INDICATOR — Model D1KBS — Range .008" — Min. Grad. .0001"
Dial, Balanced 0-4-0. — Contact, Diamond.
THROAT DEPTH — 3⅞".
VERTICAL CAPACITY — 7-7/8" with Anvil, 9-1/4" with Platen.

NOTES: Gage Head may be swung approximately ¾" either side of center. Dimensions up to 8" can be checked with just three gage blocks (1", 2", & 4"). 1" & 2" gage blocks for mastering up to 4" available as Accessory No. AT-11, complete with case.

Holding arm has large knob for coarse adjustment and brake mechanism to prevent accidental dropping of gaging unit.

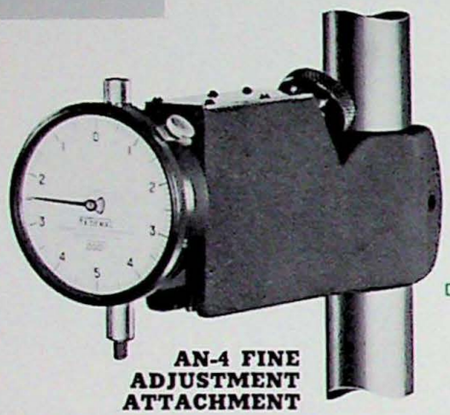
For exceptionally accurate Dial Indicator gaging, Model E1KB is recommended. This Super-Sensitive Indicator is a bellows type, completely dust-tight. It is graduated in .0001", has a balanced dial (0-4-0) and a range of .008". The capacity with the Anvil is 7¼"; with the Platen, 8⅝". Throat Depth is 4-3/16".

For longer range Dial Indicator gaging, Model C21 is recommended. An AGD style Indicator, it has a range of .025", and is graduated in .0001". Also available with continuous dial and/or revolution counter. Capacity with Anvil is 8-1/16"; with Platen, 9-7/16". Throat Depth is 4-3/16".

COMPARATOR

MODEL NB-60

- DEEP THROAT
- RIGID CONSTRUCTION
- DEPENDABLE ACCURACY



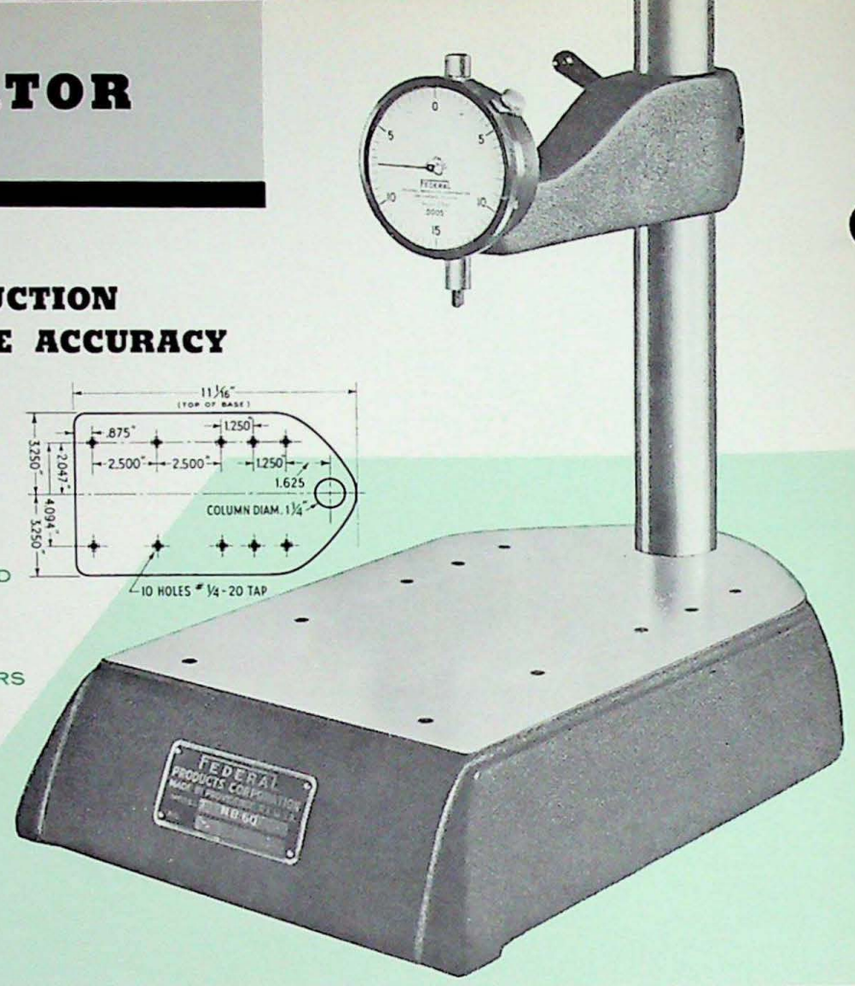
AN-4 FINE ADJUSTMENT ATTACHMENT

Provides .010" range of fine adjustment for quick, positive setting of Indicator. Particularly useful when gaging with Indicators having .0001" graduations. Furnished extra.

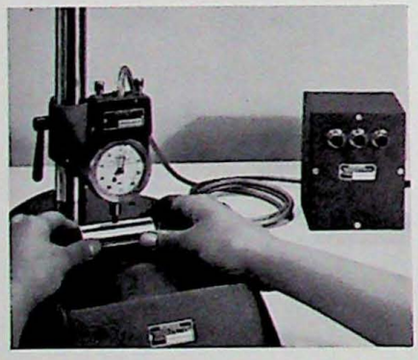
FULL JEWELED

MIRACLE MOVEMENT

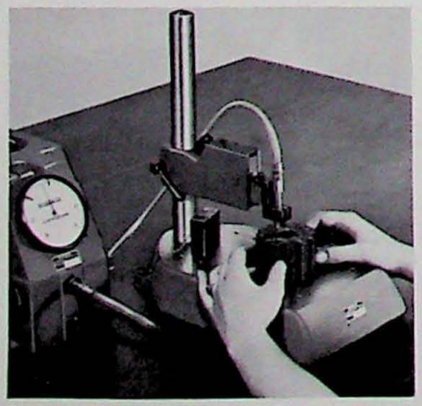
DIAL INDICATORS



OPTIONAL GAGING ARRANGEMENTS



Electricator with signal lights



With AirProbe and Dimensionair

Model NB-60 is a solidly built general purpose comparator. Its deep throat and substantial gaging capacity suit it well to all around use in the machine shop, tool room, or inspection department. Versatility and good basic design make it readily adaptable to a great variety of special applications.

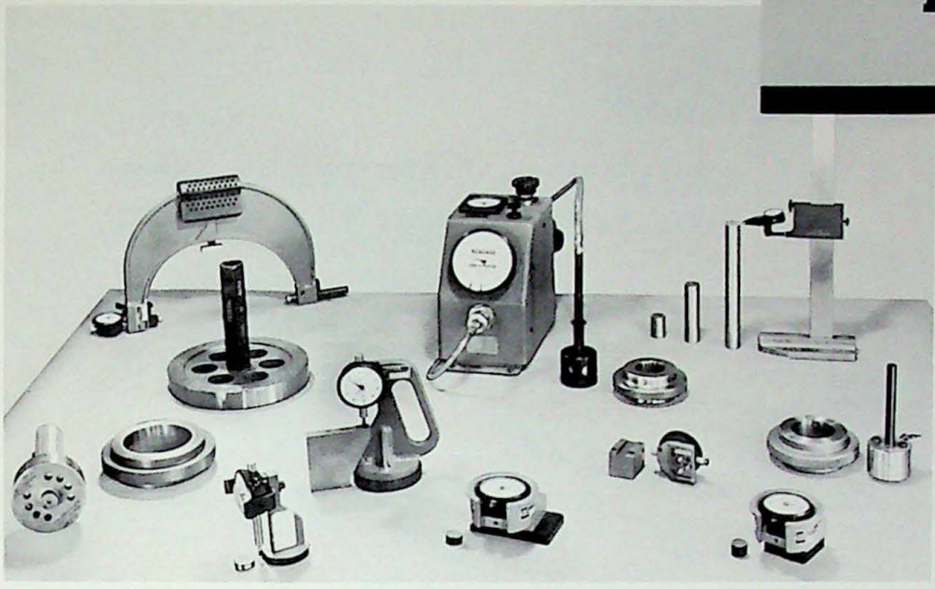
Its large, ground base has a series of ten tapped holes for convenience in securing the AN-3 Backstop Attachment, V Blocks, or other fixtures. Rigid column and support arm construction permit its use with Indicators having graduations as fine as .0001". Easily modified to suit individual requirements, the NB-60 can be equipped with limit lights for greater ease and speed in production gaging. The AN-4 Fine Adjustment Attachment, furnished as extra, equips the NB-60 for quick Indicator setting, a particular convenience when the gage is applied to general shop use.

Model NB-60 is one of the best general or special purpose gaging investments that can be found anywhere.

SPECIFICATIONS

INDICATOR	
Model	D5M
Minimum Graduation	.0005"
Dial (Bal., Adj.)	0–15–0
Metric Indicator (grad. .002 mm.)	Q6I
CONTACT	
Material	Hardened Steel
Dimensions	3/16" Radius
RANGE OF SENSITIVE CONTACT	.075"
GAGE CAPACITY	0"-8"
REFERENCE SURFACE (Ground Platen)	9 3/8"x6 1/2"
THROAT DEPTH	4 7/8"
COLUMN DIAMETER	1 1/4"
BASE DIMENSIONS (L-W-H)	10 1/2"x7 1/2"x2 1/2"
HEIGHT, OVERALL	14 1/2"
WEIGHT (Approx.)	31 lbs.

PROGRAM GAGING



Shown here is a small portion of the Gages supplied in a recent Gage Program for a large precision manufacturer. In addition to the Air and Dial Indicator Gages pictured here, the complete package included many other regular and modified Dial Indicator Gages as well as Air and Electronic types.

When planning for the production of a new model or revising procedures on an established product, what is the best way to get the answers to these obvious questions?

What Gages will be needed at what operations to insure the required quality in the finished product? And, how can "over inspecting" be avoided?

Program Gaging is the answer to both questions.

What do we mean by Program Gaging?

It is the formulation of all gaging procedures at the process engineering stage of product planning and the subsequent manufacturing and installation of all the gages under the responsibility of one supplier.

What are the advantages of Program Gaging?

1. By discussing at the engineering level, the necessary gaging for all operations with Gage Engineers, the customer's engineering staff is freed of much of the spade work. A group of Gage Engineers, working as a team, detail all gaging operations. Because they are familiar with all available gaging methods, they are in a much better position to recommend the most economical approach to each problem. When Federal Products submits a proposal for a Gaging Program, the customer receives a complete gaging operation sheet (portion illustrated at bottom of page) as a result of this engineering liaison. On these sheets, Gages are related to each part and operation, making it possible to see exactly how every proposed Gage would be used. Of course, comprehensive drawings are furnished for the Gages actually supplied, but these informal operation sheets are very helpful in discussing the program from its early stages right on through completion.

2. Program Gaging pinpoints the responsibility for all gaging on the project because it rests solely with one vendor. The customer is not required to keep surveillance of many individual suppliers. Also, in each Gaging Program undertaken by Federal, one project engineer is charged with following all aspects of the program including design, expediting, part procurement, coordination and delivery. This permits the customer to get his information from one person and eliminates the chore of coordinating delivery from several sources.

3. Follow-through after delivery. In Federal's Gaging Programs, the project engineer provides coaching to the customer's operators on the proper use, care and preventative maintenance of the equipment delivered. Here again, the customer is relieved of the nuisance of scheduling several visits by a number of engineering representatives in order to tie up the loose ends.

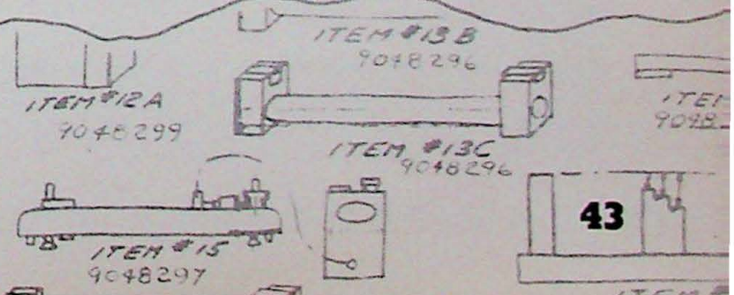
What is the Role of Program Gaging in Cost Reduction?

Not only is the customer freed of the expense of extensive detailing, coordinating, and scheduling, he can also count on recommendations which often produce substantial savings in gaging costs.

For example, while discussing the considerable gaging problems involved in the manufacture of close tolerance missile components, Federal Products Engineers pointed out that leaving a reference surface at a strategic point on a part would greatly simplify otherwise highly complex measurements. Savings here were twofold:

First, a simpler, less costly Gage could be used and, secondly, the time involved in making the measurements was much less.

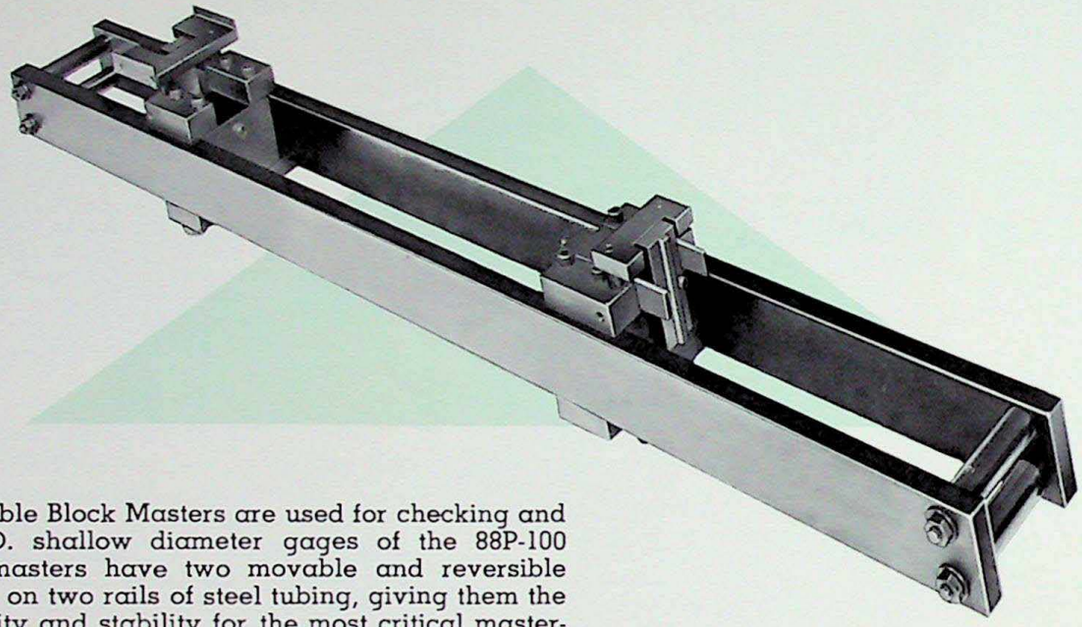
	294 & 12 –	H SET 10 GROOVE W/ –	ALL
	SPEC. MASTER	SETS ITEM #12	
15	GAGE SIMILAR TO AA67Q-46	CKS ALL LARGE DIAS	ALL
N3A	MASTER	SETS ITEM #13 – [illegible] I.D.	9125620
N3B	MASTER	SETS ITEM #13 – 10.6910 I.D.	9125621 & 28
N3C	MASTER	SETS ITEM #13 – 8.9410 I.D.	9125622 & 26
14	AIR FLATNESS GAGE SIMILAR TO A582Q-21	CKS CONCAVE OR CONVEX MASTER AT PLANO	ALL
15	GAGE SIMILAR TO AA67Q-46	ALTERNATE BUSHING	



ADJUSTABLE BLOCK MASTERS

TYPE MR-100

ADJUSTABLE MASTERS FOR SHALLOW DIAMETER GAGES



MR-100 Adjustable Block Masters are used for checking and setting I.D./O.D. shallow diameter gages of the 88P-100 series. These masters have two movable and reversible blocks mounted on two rails of steel tubing, giving them the necessary rigidity and stability for the most critical mastering applications. One block contains a fine adjustment pad for making the final, precise setting, while the reference surface in the other block is stationary. Since one master may be used to set any number of dimensions up to the maximum of its specified capacity, its usability is many times that of the more conventional mastering devices.

PRECISE, PERMANENT SET-UP

To set the MR-100 Adjustable Master, the blocks are moved along the rails to the approximate required size and firmly secured with set screws. The adjustable pad is then moved by means of a fine adjustment screw to the exact setting desired.

Once the final setting is made and all set-screws firmly tightened, the positions of the reference blocks cannot be changed even if the master should be hit accidentally. This can be of the utmost importance when the MR-100 is being used to check the settings of adjustable shallow diameter gages that have previously been set to size.

SPECIFICATIONS

Model No.	CAPACITY I.D. & O.D.
MR-101	6" - 12"
MR-102	12" - 18"
MR-103	18" - 24"
MR-104	24" - 30"
MR-105	30" - 36"
MR-106	36" - 42"

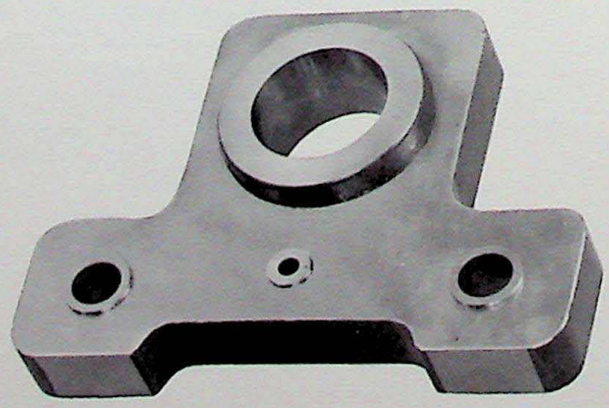
Measuring Depth — All Models Adjustable from 0 to 5".

Masters with larger and smaller capacities also available.

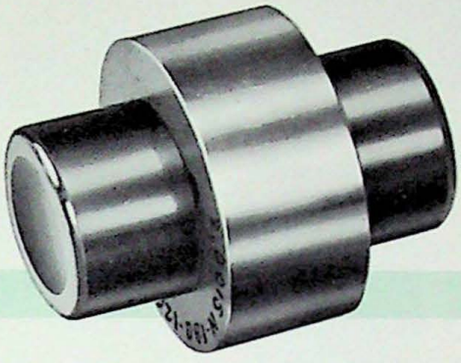
SPECIAL MASTERS

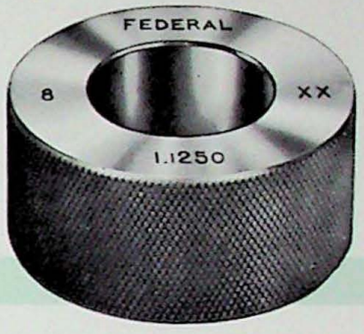
Frequently a Gage built specially for measuring odd shaped parts or for checking a variety of dimensional relationships requires special or multiple masters. Federal's complete service includes the design and manufacture of special masters whenever required.

Illustrated is a master which establishes the true vertical centerline of two counter bores with respect to a larger hole, so that a special Dial Indicator Gage can check the co-ordinate location of the counter-bores.



SETTING DISCS and RINGS

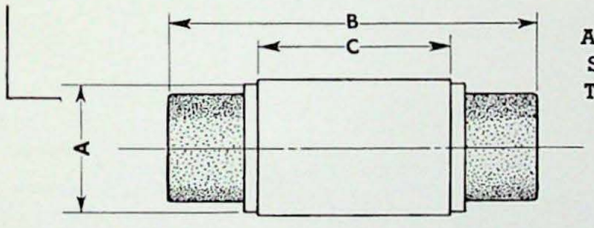




Master Discs and Rings are furnished for your convenience in setting snap gages, holes gages, comparator, and other type gages to required nominal dimensions. They are made of fine quality hardened steel, and conform in all respects to American Gage Design Standards. The preciseness with which they are finished to nominal size falls into four classifications (XX, X, Y and Z) which are characterized by tolerances set up as a voluntary standard of the trade.

The user should make his selection with due consideration for the tolerance of the work being inspected by the gage for which the master is required. It is generally accepted as good practice to select a master whose tolerance is approximately 10% of that specified for the work to be gaged.

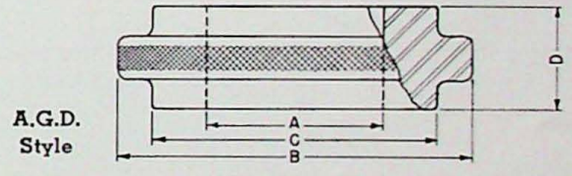
The following information may be helpful in determining the proper class of Master Ring or Disc to specify.



A.G.D. Style Three

DISCS

A Diameter Range	B	C
.150– .240	1 3/8	7/16
.240– .365	1 11/16	1/2
.365– .510	1 7/8	9/16
.510– .825	1 15/16	5/8
.825–1.135	2 1/4	11/16
1.135–1.510	2 3/8	13/16
1.510–2.010	2 3/8	7/8
2.010–2.510	2 3/8	7/8
2.510–3.010	3 3/8	1
3.010–3.510	3 3/8	1
3.510–4.010	3 3/8	1
4.010–4.510	3 3/8	1



A.G.D. Style

RINGS

A Size Range	B	C	D
.130– .240	15/16		3/8
.240– .365	1 1/8		9/16
.365– .510	1 3/8		3/4
.510– .825	1 3/4		15/16
.825–1.135	2 1/8		1 1/8
1.135–1.510	2 1/2		1 5/16
1.510–2.010	4	A + 7/8	1 1/2
2.010–2.510	4 1/2	A + 7/8	1 1/2
2.510–3.010	5	A + 1	1 1/2
3.010–3.510	5 1/2	A + 1	1 1/2
3.510–4.010	6 3/8	A + 1 1/8	1 1/2
4.010–4.760	7 1/4	A + 1 1/8	1 1/2
4.760–5.510	8 1/4	A + 1 1/8	1 1/2
5.510–6.260	9 1/4	A + 1 1/8	1 1/2

CLASSES AND TOLERANCES

SIZE RANGE OF WORK		TOLERANCE OF MASTER			
Above	To and including	Class XX	Class X	Class Y	Class Z
.105	.825	.00002	.00004	.00007	.00010
.825	1.510	.00003	.00006	.00009	.00012
1.510	2.510	.00004	.00008	.00012	.00016
2.510	4.510	.00005	.00010	.00015	.00020
4.510	6.510	.000065	.00013	.00019	.00025
6.510	8.510	.00008	.00016	.00024	.00032

ALL DIMENSIONS IN INCHES

WHEN ORDERING:

1. Please specify CLASS and EXACT SIZE required.

UNLESS OTHERWISE SPECIFIED:

1. Master *rings* will be made to *minimum* workpiece size. Master *discs* will be made to *maximum* workpiece size.
2. Tolerance of master will be split evenly plus and minus from required size.

ALSO AVAILABLE (Prices on request)

1. Masters of larger or smaller size than those listed.
2. Masters having hard-chrome or other plating.

SPECIAL DIAL INDICATOR GAGES

give you

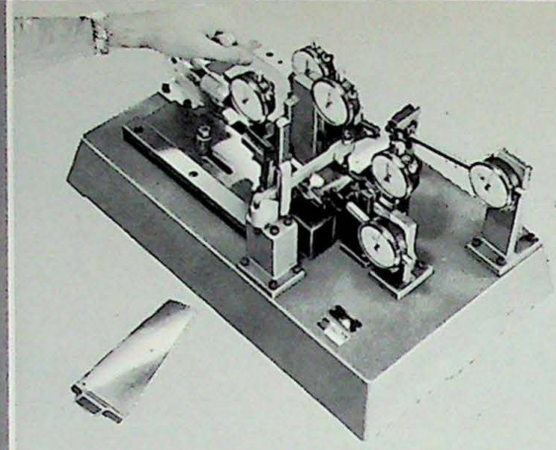
greater gaging economy

through

faster
easier
more accurate inspection

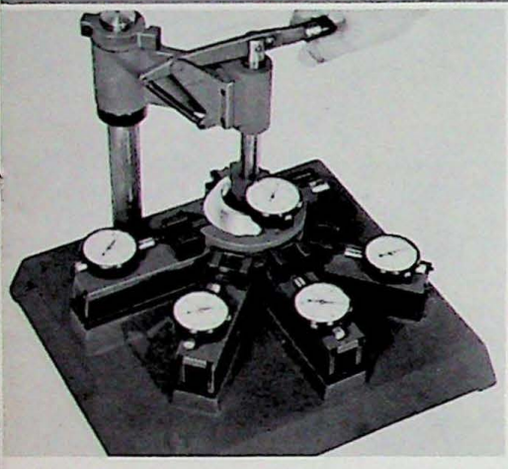
of

multiple
or difficult dimensions



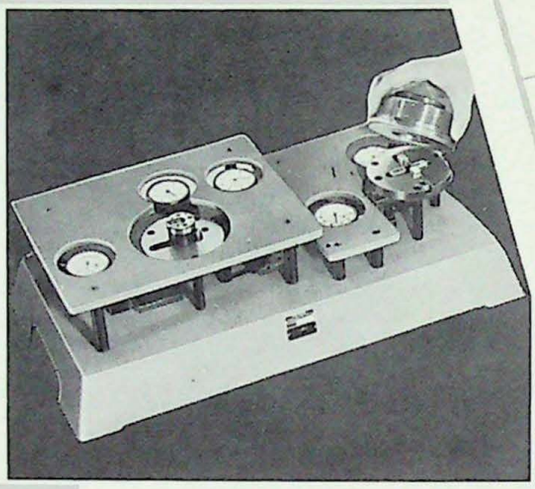
MODEL 259B-158

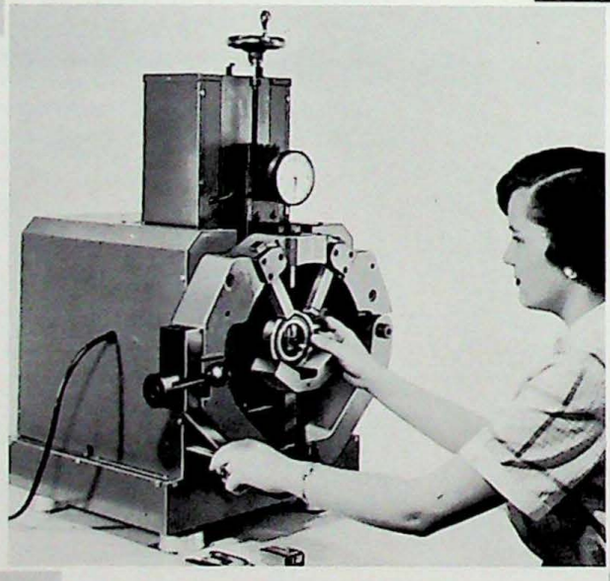
Checks thickness of jet turbine blade at six different points simultaneously.



MODEL 236B-353

Measures four outside diameters of part plus internal shoulder depth.



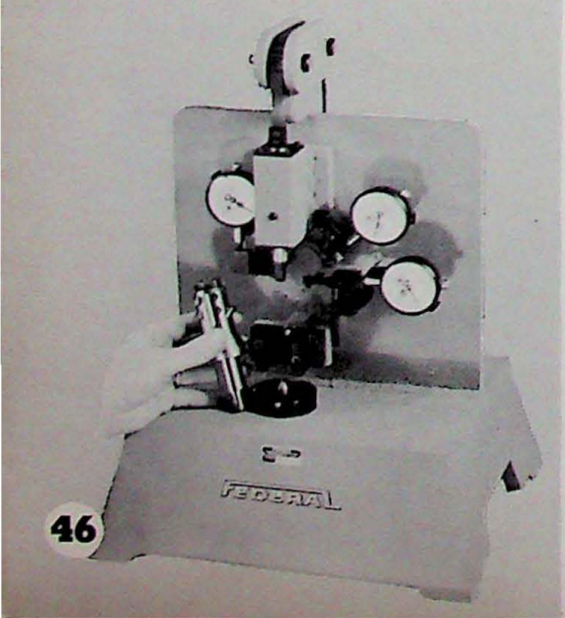


MODEL 247B-354

Two station gage for rocket head. First station (left) measures depth of two shoulders plus minor diameter of thread. Second station checks two internal diameters.

MODEL 247B-368

Measures radial play between inner and outer races of ball bearings. Lever exerts up and down pressure on inner race. Outer race is clamped. Balls are settled automatically as soon as part is loaded.

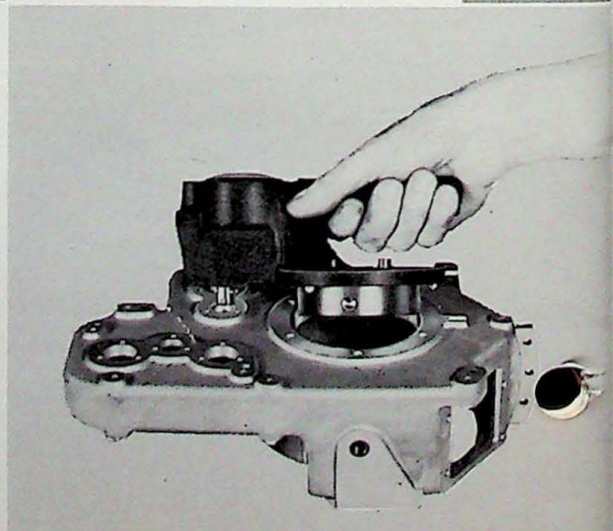


MODEL 444B-162

Checks multiple setting of three tool bits on boring bar used for high production work.

MODEL 444P-96

Centralizes in small hole and large hole to measure center distance between them.



Over 60,000 Gage Designs

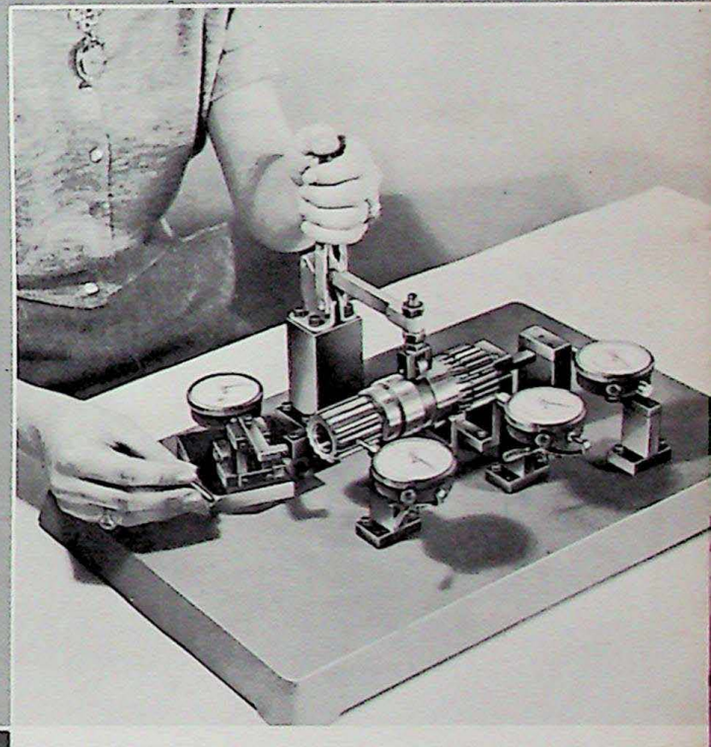
Ready to serve every dimensional gaging need

SPECIAL DIAL INDICATOR GAGES

Despite the fact that stock model Dial Indicator Gages provide the most effective answer to a multitude of gaging requirements, the extra speed and ease of measurement that can be realized through the use of specially designed gages makes their use of utmost importance to practically every concern which must keep pace with today's accelerated production needs.

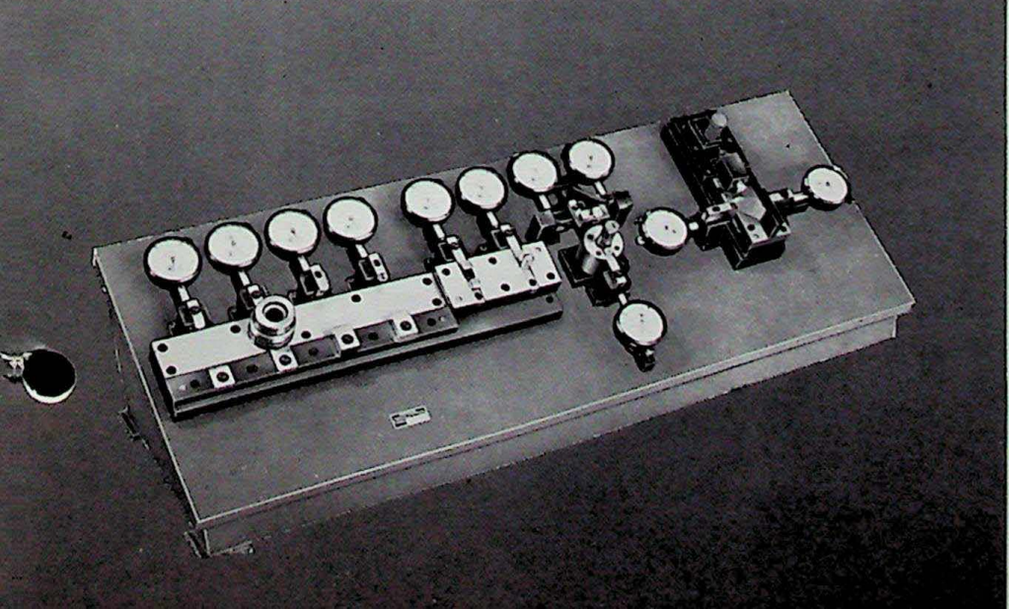
Federal has devoted its efforts exclusively to designing and manufacturing *all types* of Dimensional Indicating Gages. In its files are over 60,000 gage designs of which those illustrated on these pages are representative. With this wealth of experience and information at your disposal, it's just plain good business to call on Federal when your requirements are special. You can be sure of getting a well designed, low-cost, accurate gage. Chances are that we have already designed and built a gage which will fit your special requirements. This means time and money saved for you.

This design service is yours for the asking. Simply place your requirements before your local Federal Representative or write directly giving us all pertinent details. Please include a blueprint and, if possible, a sample of the work to be gaged.



MODEL 205B-1076

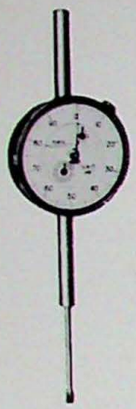
Shows concentricity of pitch diameters of two sets of teeth and concentricity of end holes against body O.D. . . . . at a glance.



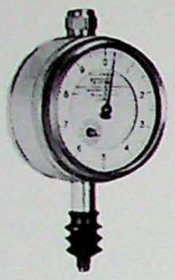
MODEL 247B-314

Multiple station gage makes eleven checks for I.D. and O.D. concentricities and diameters in a fraction of the time and with a fraction of the equipment formerly required.

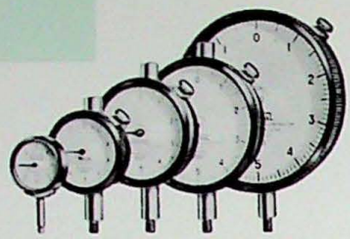
dial indicators



LONG RANGE



WETPROOF



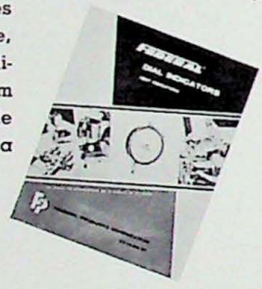
REGULAR — 5 SIZES
60 STOCK MODELS

PERPENDICULAR

TESTMASTER

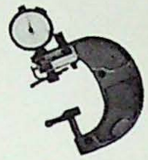
The most complete line available today. Low-friction, Full Jeweled, Cushion Movements. Wide variety of sizes, graduations, and ranges in regular style, perpendicular, long range, long stem, Wetproof, and Super-Sensitive Indicators, available from stock. Graduations from .00005" to .001". Metric graduations available also. Many styles of backs and points plus a variety of accessories.

Send for Catalog 64



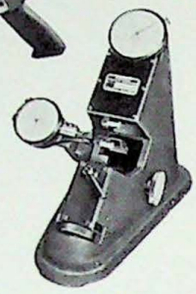
modified dial gages

HOLE I.D.

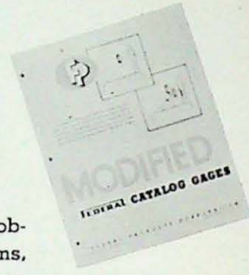


GEAR

DEPTH



PITCH DIAM.

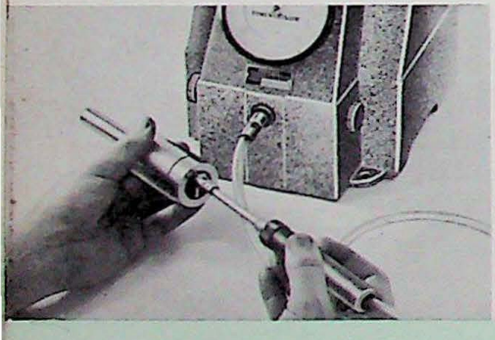


The economical answer to many gaging problems involving out of the ordinary dimensions, special measuring surfaces, or unusual types of measurement. Federal has made thousands of modifications to regular style gages. The most typical modifications have been combined into an interesting and valuable catalog which you should have as a reference and idea source.

Send for Catalog A-445

OTHER

air gages - *DIMENSIONAIR*

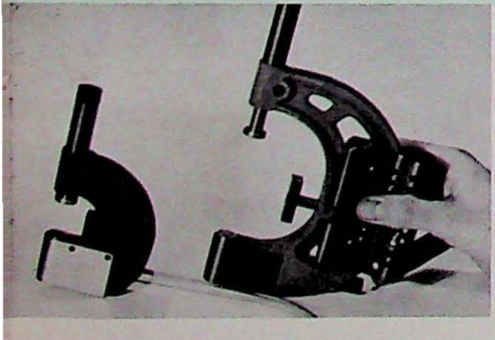


ADJUSTABLE AIR BORE GAGES

Can be quickly attached to Dimensionair without tools. Light, well-balanced, can be set by means of gage blocks. Provide sure centralization, high accuracy measurement, and increase the utility of your Dimensionair.

AIR PROBE

—the air-sensitive mechanical contact for a variety of measurements.



ADJUSTABLE AIR SNAPS

Provide air gage accuracy for snap gage measurement. Attach quickly. Use like other snaps but get readings to .00005"! Permit close-to-shoulder measurement. Five sizes cover 0" to 6" diameters.

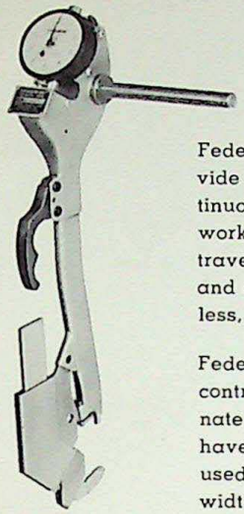
2500 OR 5000 TO 1 MAGNIFICATION
ACCURATELY CALIBRATED DIAL
SINGLE OR MULTIPLE UNITS.

Send for Catalog 64D

Today's air gaging requirements call for dependable accuracy and sensitivity. The Federal Dimensionair is the most efficient dimensional air gage you can use . . . the only one made to predetermined accuracy. The Dimensionair requires only one master and its the *only* air gage that does! Setting up is beautifully simple . . . ten seconds and you're ready for gaging.

And the Dimensionair has so many operational advantages . . . three times more measuring range (.003") than any previous gage . . . no gage drift; hours, days or weeks after . . . operates on any pressure from 40 to 100 pounds . . . reads directly to .00005" and has longer approach range . . . chrome plated plugs have deeper set jets and greater clearance in hole, providing better protection, longer life and ease of gaging.

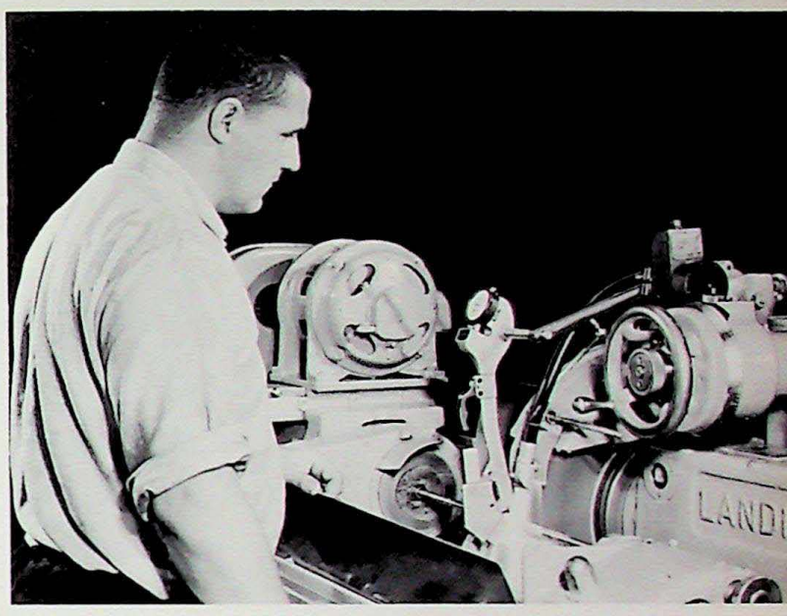
FEDERAL grinding gages



Federal's Model 50M Series Grinding Gages provide an efficient and accurate means of continuously inspecting dimensions of cylindrical work *while* it is being ground, whether by traverse or plunge cut methods. They are easily and quickly installed. Operation is fast and effortless, requiring no unusual training or skill.

Federal's 50M Series Gages give you added control over the grinder, permitting you to eliminate overgrinding and reduce scrap. You no longer have to stop the machine to gage. They can be used to check outside diameters, inside or outside widths between shoulders or flanges, tapered diameters and work having splines or keyways. Catalog gives you complete information.

Send for Catalog 65FG



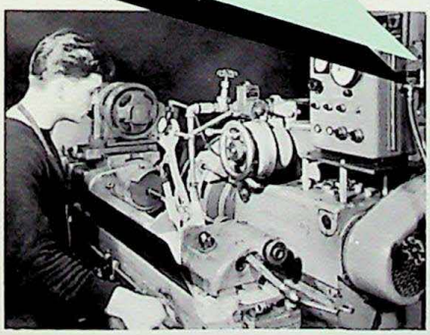
PRODUCTS

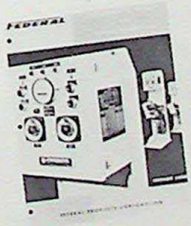
FEDERAL

AUTOMATION

machine control gages

automatic sorting gages

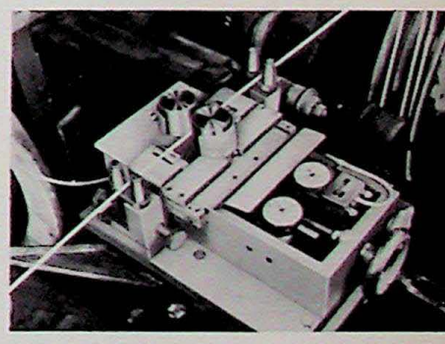


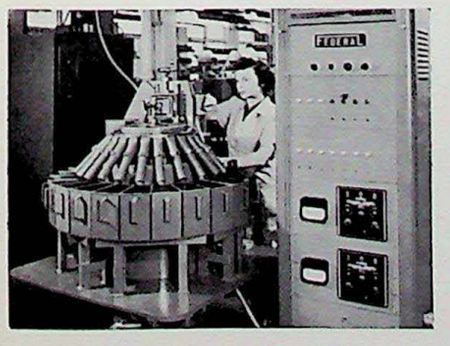


Send for Catalog 65AM

These special gages automatically control continuous process machines or machine tools so that all work is produced within tolerance, thus eliminating scrap and the need for later inspection. They use electrical or electronic control in combination with air, mechanical, or electronic means of gaging, achieving true Automation.

Federal has had extensive experience in designing and building "sure fire" control gages. New catalog gives full particulars.





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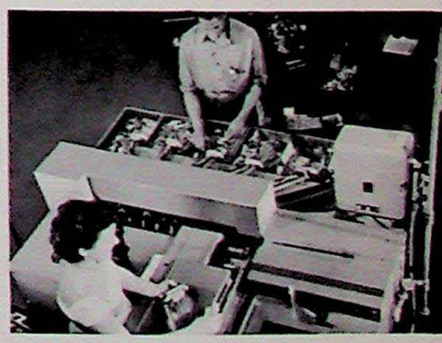

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A385G 15765